

**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION**

TQ DELTA, LLC,

Plaintiff,

v.

**COMMSCOPE HOLDING COMPANY, INC.,
COMMSCOPE INC., ARRIS
INTERNATIONAL LIMITED, ARRIS
GLOBAL LTD., ARRIS US HOLDINGS, INC.,
ARRIS SOLUTIONS, INC., ARRIS
TECHNOLOGY, INC., and ARRIS
ENTERPRISES, LLC**

Defendants.

CIV. A. NO. 2:21-CV-310-JRG
(Lead Case)

TQ DELTA, LLC,

Plaintiff,

v.

**NOKIA CORP., NOKIA SOLUTIONS AND
NETWORKS OY, and NOKIA OF AMERICA
CORP.,**

Defendants.

CIV. A. NO. 2:21-CV-309-JRG
(Member Case)

NOKIA DEFENDANTS' INITIAL INVALIDITY CONTENTIONS

Pursuant to this Court's Docket Control Order (Dkt. No. 62), Nokia Defendants Nokia Corporation, Nokia Solutions and Networks Oy, and Nokia of America Corporation (collectively, "Nokia" or "Nokia Defendants") respectfully submits these invalidity contentions and an accompanying document production with respect to the claims identified by Plaintiff TQ Delta, LLC ("TQ Delta") in its Preliminary Infringement Contentions.

TQ Delta Exhibit 2023
COMMSCOPE, INC. v. TQ DELTA LLC
IPR2023-00066

NOKIA DEFENDANTS' INVALIDITY CONTENTIONS

The Asserted Claims, as reflected in the Infringement Contentions, are claims 17, 18, 19, 36, 37, 38, and 40 of 7,570,686 (“the ’686 Patent”); claims 9, 13, 14, and 15 of 7,844,882 (“the ’882 Patent”); claim 14 of 8,090,008 (“the ’008 Patent”); claims 10, 11, 17, 18, 19 and 25 of 8,468,411 (“the ’411 Patent”); claims 10, 28, and 36 of 8,495,473 (“the ’5473 Patent”); claims 8, 9, and 11 of 8,594,162 (“the ’162 Patent”); claims 16, 17, 18, 30, 31, 32, 37, 38, 39, 44, 53, 54, 55, and 60 of 8,595,577 (“the ’577 Patent”); claims 16 and 22 of 8,937,988 (“the ’988 Patent”); claims 1, 9, 10, 11, 12, and 13 of 9,014,193 (“the ’193 Patent”); claims 1, 2, 3, 4, 9, 10, 11, and 12 of 9,094,348 (“the ’348 Patent”); claims 10, 11, and 12 of 9,154,354 (“the ’354 Patent”); claims 8, 9, 13, 14, 15, 16, 17, 18, and 21 of 9,300,601 (“the ’601 Patent”); claims 11, 17, and 19 of 9,485,055 (“the ’055 Patent”); claims 2, 3, and 4 of 9,547,608 (“the ’608 Patent”); claims 1 and 3 of 9,894,014 (“the ’014 Patent”); claims 1, 2, 3, 4, and 8 of 10,044,473 (“the ’4473 Patent”); claims 21, 22, and 23 of 10,409,510 (“the ’510 Patent”); claims 8, 10, 11, 12, and 14 of 10,567,112 (“the ’112 Patent”); and claims 1, 2, 3, 4, 6, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 20, 22, 23, 24, 25, 27 of 10,833,809 (“the ’809 Patent”). The patents are referred to collectively as the “Asserted Patents.”

I. PRELIMINARY STATEMENT

These invalidity contentions are preliminary in nature and do not address claim construction or noninfringement. Nokia Defendants reserve all rights with respect to such issues, including their position that claims of the Asserted Patents should be construed in a particular manner and/or are not infringed. These invalidity contentions are based on Nokia Defendants’ current knowledge, understanding, and belief of the Asserted Patents and prior art, of TQ Delta’s infringement theories (as disclosed in the Infringement Contentions), and of the facts and other information available as of the date of these invalidity contentions. Nokia Defendants’ investigation, discovery, and analysis of information related to this action is ongoing. Additional

discovery and/or orders of the Court may require Nokia Defendants to amend or supplement these invalidity contentions, and Nokia Defendants expressly reserve the right to do so as the case proceeds. These contentions represent Nokia Defendants' good-faith effort to provide a comprehensive identification of prior art relevant to this case, but Nokia Defendants reserve the right to modify or supplement their prior art list and invalidity contentions at a later time with, or based upon, pertinent information that may be subsequently discovered.

A. No Waiver.

Nothing in these invalidity contentions is intended, nor should be construed, as a waiver of any claim construction argument, noninfringement position, or argument under 35 U.S.C. § 112. Nokia Defendants' statements herein (including the accompanying claim charts) reflect Nokia Defendants' present understanding of the purported scope of the claims as alleged by TQ Delta in its Preliminary Infringement Contentions (as best those contentions can be understood in light of their present deficiencies). For the avoidance of doubt, these contentions are not intended to present or argue in favor of any construction of the Asserted Claims, and Nokia Defendants expressly reserve the right to present constructions that differ from any construction that may be alleged to underlie these contentions. The Court established separate deadlines for the parties' proposed claim constructions, and Nokia Defendants will disclose their proposed constructions accordingly. These invalidity contentions do not constitute an acquiescence to TQ Delta's interpretation of any claims to the extent they depart from the plain meaning of the Asserted Claims and from the proper scope of the claims as may be subsequently construed by the Court. Nokia Defendants disagree with TQ Delta's apparent positions as to the purported scope of the Asserted Claims to the extent they seek to expand or otherwise alter the scope of the Asserted Claims beyond their proper construction.

The Asserted Claims have not yet been construed by the Court in this case and, thus, Nokia Defendants have not yet had the opportunity to compare the Asserted Claims of the Asserted Patents (as construed by the Court) with the prior art. Nokia Defendants reserve the right to amend, supplement, or materially modify their invalidity contentions after the claims have been construed by the Court in this case. Nokia Defendants also reserve the right to amend, supplement, or materially modify their invalidity contentions in response to any claim construction positions that TQ Delta may take. Nokia Defendants also reserve the right to assert that a claim is indefinite, not enabled, or fails to meet the written description requirement of 35 U.S.C. § 112 based on any claim construction position TQ Delta may take in this case or based on any claim construction the Court may adopt in this case.

B. No Admission.

Nothing disclosed herein is an admission or acknowledgement that any product accused of infringement by TQ Delta in its Preliminary Infringement Contentions (the “Accused Products”), or any of Nokia Defendants’ other products, infringes any of the Asserted Claims.

Nokia Defendants further note that TQ Delta appears to rely on overly broad constructions of the Asserted Claims. At the same time, TQ Delta’s Preliminary Infringement Contentions are in most places too general and vague to discern TQ Delta’s infringement theories and how exactly TQ Delta contends each Accused Product meets or practices each element of each of the Asserted Claims. For example, TQ Delta’s Preliminary Infringement Contentions fail to clearly identify the aspects or features of the Accused Products that TQ Delta contends meet the elements of the Asserted Claims. As a result, Nokia Defendants have been prejudiced in their ability to prepare these invalidity contentions. To the extent that TQ Delta is later permitted by the Court to amend its contentions to cure the deficiencies of its current contentions or to pursue any currently

undisclosed doctrine of equivalents theories, Nokia Defendants expressly reserve the right to supplement or amend these invalidity contentions to account for such amendments.

To the extent that any of the prior art references disclose the same functionality or feature of any of the Accused Products, Nokia Defendants reserve the right to argue that said feature or functionality does not practice any element of any of the Asserted Claims, and to argue, in the alternative, that if said feature is found to practice any element of any of the Asserted Claims, then the prior art reference demonstrates that the element is not novel, would have been obvious, and/or is otherwise not patentable.

Attached hereto are representative claim charts that demonstrate how the Asserted Claims of the Asserted Patents are invalid in view of certain prior art. The references cited in the attached claim charts may disclose the limitations of the Asserted Claims expressly and/or inherently. The suggested obviousness combinations may be presented in conjunction with or in the alternative to Nokia Defendants' contentions regarding anticipation. These obviousness combinations should not be construed to suggest that any reference included in any combination is not anticipatory in its own right.

C. Reservation of Rights.

Prior art not included in this disclosure may become relevant. Nokia Defendants are currently unaware of the extent, if any, to which TQ Delta will contend that limitations of the Asserted Claims are not disclosed in the prior art identified by Nokia Defendants. Nokia Defendants reserve the right to identify other references that would have made the addition of the allegedly missing limitation to the disclosed device or method obvious or show that the allegedly missing limitation would have been known or readily apparent to one of ordinary skill in the art at the time of the invention in light of the disclosure of the prior art at issue.

Nokia Defendants are reviewing TQ Delta's document production to date and will seek to supplement these invalidity contentions, as may be warranted, once Nokia Defendants have had a fair opportunity to review and analyze that production, including any pertinent prior art provided therein. Nokia Defendants also reserve the right to amend their invalidity contentions with any additional potential prior art known by TQ Delta but not yet disclosed to Nokia Defendants.

Nokia Defendants provide these invalidity contentions only for the claims asserted by TQ Delta, but reserve the right to seek invalidation of all claims in each of the Asserted Patents.

D. Ongoing Investigation.

Nokia Defendants' investigation is ongoing, and Nokia Defendants expressly reserve the right to amend their disclosures and document production to account for evidence uncovered as their investigation continues. Such amendments include identifying and relying on additional references that may result from Nokia Defendants' further search and analysis. Nokia Defendants reserve the right to supplement these contentions in light of any additional prior art of which TQ Delta is aware and did not disclose to Nokia Defendants in discovery, or that might be subsequently disclosed by TQ Delta in response to Nokia Defendants' discovery requests. Nokia Defendants anticipate issuing subpoenas to third parties believed to have knowledge, documentation and/or corroborating evidence concerning some of the prior art listed herein and/or additional prior art. These third parties include, but are not limited to, the authors, employers of authors, inventors, assignees, or former or current employees of assignees, of the references identified in these invalidity contentions. For example, Nokia Defendants anticipate that they may issue subpoenas to potential prior artists including but not limited to individuals and entities responsible for the development of certain prior art systems. Nokia Defendants reserve the right to supplement these

contentions in light of any newly discovered information produced by these or other individuals or companies.

E. Incorporation of Admitted Prior Art

Each of the asserted patents contains numerous descriptions of the state of the prior art, disclosure which would have been obvious to one skilled in the art, and other admitted prior art. Nokia Defendants incorporate by reference and reserve the right to rely upon the admitted prior art disclosures of the asserted patents, including for the purposes of background art, evidence of knowledge of a skilled artisan, or with other disclosure to demonstrate that an asserted claim is invalid as obvious.

F. Incorporation by Reference of CommScope Defendants' Invalidity Contentions

To the extent that TQ Delta has accused CommScope Holding Company, Inc., CommScope Inc., Arris International Limited, Arris Global Ltd., Arris US Holdings, Inc., Arris Solutions, Inc., Arris Technology, Inc., and Arris Enterprises, LLC (collectively, the "CommScope Defendants") of infringing the same patents and claims as is asserted against the Nokia Defendants, and the CommScope Defendants have provided invalidity contentions corresponding to those patents and claims, Nokia Defendants incorporate CommScope Defendants' invalidity contentions by reference, as if fully set forth herein, with respect to the overlapping patents and claims. Nokia Defendants understand that this overlap encompasses the following patents and claims and thus incorporate by reference the invalidity contentions made by CommScope as to the following claims:

Asserted Patents	Asserted Claim(s)
7,570,686	17, 18, 19, 36, 37, 38, 40
7,844,882	9, 13, 14, 15
8,090,008	14
8,468,411	10, 11, 17, 18, 19, 25

Asserted Patents	Asserted Claim(s)
8,937,988	16, 22
9,094,348	1, 2, 3, 4, 9, 10, 11, 12
9,154,354	10, 11, 12
9,485,055	11, 17, 19,
10,567,112	8, 10, 11, 12, 14
10,833,809	1, 2, 3, 4, 6, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 20, 22, 23, 24, 25, 27

II. THE ASSERTED FAMILY 1 PATENT IS INVALID.

A. Identification of Prior Art

Nokia Defendants contend that the prior art references described and charted in Exhibits F1-686A – F1-686K and F1 Secondary-686 anticipate and/or render obvious, alone or in combination, one or more of the Asserted Claims of the Family 1 Patent.

B. The Asserted Claims Are Anticipated and/or Rendered Obvious.

TQ Delta asserts claims 17, 18, 19, 36, 37, 38, and 40 of U.S. Patent No. 7,570,686 (the “686 Patent” or “Family 1 Patent”) against the Nokia Defendants in this lawsuit. These claims are invalid because the Family 1 Patent fails to meet one or more of the requirements for patentability. The individual bases for invalidity are provided below and in Exhibits F1-686A – F1-686K and F1 Secondary-686. Each of the prior art references, the underlying work, and/or the underlying apparatus or method qualifies as prior art under one or more sections of 35 U.S.C. §§ 102 and/or 103.

In an effort to focus the issues, the Nokia Defendants have cited representative portions of identified references, even where a reference may contain additional disclosures or support for a particular claim element. Each and every disclosure of the same limitation in the same reference is not necessarily identified. In addition, persons of ordinary skill in the art generally read a prior art reference as a whole and in the context of other publications and literature and in the context

of their knowledge as persons of ordinary skill in the art. Thus, to understand and interpret any specific statement or disclosure within a prior art reference, such persons would rely on other information within the reference, along with other publications and their general scientific knowledge and experience in the field. Thus, each prior art reference identified herein should be understood in the context of the reference itself, in conjunction with anything incorporated by reference or described as relevant technology by the reference, any documents that are referred to for further understanding by the reference, any system embodying the reference, and any testimony by those with knowledge of the reference, such as the named authors and inventors. The Nokia Defendants may rely on uncited portions of the prior art references and on other publications and expert testimony to provide context, and as aids to understanding and interpreting the portions that are cited. The Nokia Defendants may also rely on uncited portions of the prior art references, other disclosed publications, and the testimony of experts to establish that a person of ordinary skill in the art would have been motivated to modify or combine certain of the cited references so as to render the claims obvious.

1. The Family 1 Patent Priority Date.

TQ Delta's Preliminary Infringement Contentions allege that the Asserted Claims of the Family 1 Patent are entitled at least to the priority date January 7, 2000, or in the alternative, August 10, 2000, or in the alternative, January 8, 2001. To the extent TQ Delta alleges that any prior art relied on in these invalidity contentions does not qualify as prior art to an Asserted Patent, Nokia Defendants reserve the right to rebut those allegations (*e.g.*, by demonstrating an earlier relevant date for the challenged prior art and/or a later priority date for the Asserted Patent and/or Asserted Claim).

2. The Family 1 Patent Is Anticipated and/or Rendered Obvious by the Prior Art.

Some or all of the Asserted Claims of the Family 1 Patent are invalid as anticipated and/or rendered obvious under 35 U.S.C. §§ 102 and/or 103 in view of each of the primary prior art references identified in the claim charts included in Exhibits F1-686A – F1-686K, which identify specific examples of where each limitation of the Asserted Claims is found in the prior art references. As explained above, the cited portions of prior art references identified in the attached claim charts are exemplary in nature and representative of the content and teaching of the prior art references, and should be understood in the context of the reference as a whole and as they would be understood by a person of ordinary skill in the art.

Nokia Defendants identify the following references as anticipating and/or rendering obvious one or more of the Asserted Claims of the Family 1 Patent under 35 U.S.C. §§ 102 and/or 103. The table of anticipating and/or rendering obvious references below is exemplary, and it does not constitute an admission that any reference not listed below does not also anticipate and/or render obvious the claims of the Family 1 Patent. Further, Nokia Defendants contend that any prior art reference in the attached charts that is charted for each limitation of any given claim, anticipates that claim, regardless of whether that prior art reference is listed in the following table.

Exhibit	Primary Prior Art	Date¹
F1-686A	U.S. Patent No. 6,606,719 to Ryckebusch (“Ryckebusch”)	March 31, 1999
F1-686B	U.S. Patent No. 6,445,730 to Greszczuk (“Greszczuk”)	January 26, 1998

¹ Nokia Defendants reserve the right to identify additional bases for qualification as prior art for each of the identified references in the event that it is determined that the Asserted Patents are not entitled to the claimed priority date.

Exhibit	Primary Prior Art	Date¹
F1-686C	U.S. Patent No. 6,788,705 to “Rango”	January 18, 2000
F1-686D	U.S. Patent No. 6,636,603 to Milbrandt (“Milbrandt 603”)	July 30, 1999
F1-686E	U.S. Patent No. 4,679,227 to Hughes-Hartogs (“Hughes-Hartogs”)	May 20, 1985
F1-686F	Telebit 2500 (“Telebit 2500”)	1990
F1-686G	U.S. Patent No. 6,219,378 to Wu (“Wu”)	September 17, 1997
F1-686H	Network and Customer Installation Interfaces – Asymmetric Digital Subscriber Line (ADSL) Metallic Interface (“T1.413-1998”)	November 11, 1998
F1-686I	SAD-Golden ATU-C (“Golden ATU”)	May 5, 1999
F1-686J	U.S. Patent No. 6,434,119 to Wiese (“Wiese”)	July 7, 1998
F1-686K	Speed Touch ADSL Modem (“Speed Touch”)	1999

To the extent any item of prior art cited above is deemed not to disclose and/or render obvious, explicitly or inherently, any limitation of an Asserted Claim of the Family 1 Patent, Nokia Defendants reserve the right to argue that any difference between that prior art and the corresponding patent claim would have been either inherent in the art or obvious to a person of

ordinary skill in the art, even if Nokia Defendants have not specifically denoted that the art is to be combined with the knowledge of a person of ordinary skill in the art.

3. The Family 1 Patent Is Obvious Over the Prior Art.

To the extent TQ Delta argues that any limitation of the Asserted Claims of the Family 1 Patent are not explicitly disclosed and/or rendered obvious by an item of prior art identified above and in Exhibits F1-686A – F1-686K and F1 Secondary-686, any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. The item of prior art would, therefore, render such claims invalid as obvious under 35 U.S.C. § 103.

a) The Claims Are Obvious Over the Primary References in Light of One or More Secondary References.

To the extent the foregoing references are found not to anticipate and/or render obvious the Asserted Claims of the Family 1 Patent, the foregoing references render the Asserted Claims obvious, either alone or in combination with one or more of the other references identified above. One of ordinary skill in the art would have been motivated to combine the various references cited above and herein so as to disclose each and every limitation of the Asserted Claims of the Family 1 Patent.

Prior art references rendering the Asserted Claims of the Family 1 Patent obvious, either alone or in combination with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686, are provided in the tables above and below and in Exhibits F1-686A – F1-686K and F1 Secondary-686. The prior art identified in Exhibits F1-686A – F1-686K render one or more asserted claims of the Family 1 Patent obvious when the references are read in combination with one or more of each other, when read in combination with any of the prior art identified in Exhibit

F1 Secondary-686, and/or when read in view of the state of the art and knowledge of those skilled in the art.

F1 Secondary Exhibit	Date
U.S. Patent No. 6,590,893 to Hwang (“Hwang”)	April 7, 1999
U.S. Patent No. 6,366,644 to Sisk (“Sisk”)	September 15, 1997
U.S. Patent No. 6,865,232 to Isaksson (“Isaksson”)	July 15, 1997
U.S. Patent No. 4,438,511 to Baran (“Baran”)	November 10, 1980
U.S. Patent No. 5,838,268 to Frenkel (“Frenkel”)	March 14, 1997
U.S. Patent No. 6,891,803 to Chang (“Chang”)	December 18, 1998
U.S. Provisional Application 60/078,549 to Jacobsen (“Jacobsen”)	March 19, 1998
Network and Customer Installation Interfaces – Asymmetric Digital Subscriber Line (ADSL) Metallic Interface (“T1.413-1995”)	August 18, 1995
Series G: Transmission Systems and Media, Digital Systems and Networks (“G.992.1”)	June 22, 1999
Data Communications Networking Devices: Operation, Utilization and LAN and WAN Internetworking, 4 th Edition, by Gilbert Held (“Held”)	January 1999
ADSL Forum Technical Report TR-024 (“TR-024”)	June 1999

To the extent TQ Delta argues that any Asserted Claim of the Family 1 Patent is not disclosed or rendered obvious by any Exhibits F1-686A – F1-686K and F1 Secondary-686 reference, the Asserted Claims nevertheless would have been obvious in light of one or more other Exhibits F1-686A – F1-686K references and/or one or more references identified and charted in Exhibits F1 Secondary-686 and in view of the knowledge, experience, and understanding of persons of ordinary skill in the art.

Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with another to render obvious (and therefore invalid) each of TQ Delta’s Asserted Claims. Nokia Defendants may rely on a subset of (or all of) the above-identified references, including all references in Exhibits F1-686A – F1-686K and F1 Secondary-686, for purposes of obviousness depending on the Court’s claim construction, positions taken by TQ Delta during this litigation, and further investigation and discovery.

b) Exemplary Combinations of the Prior Art.

The table below provides an identification of exemplary combinations of prior art references that, based on Nokia Defendants’ present understanding of TQ Delta’s Preliminary Infringement Contentions and apparent reading of the Asserted Claims, render obvious one or more of the Asserted Claims of the Family 1 Patent. The combinations of references identified below are non-exhaustive, and additional examples are apparent from other combinations of references addressed in Exhibits F1-686A – F1-686K and F1 Secondary-686. Nokia Defendants expressly note that, although certain references charted in Exhibits F1-686A – F1-686K are listed variously in the left or right column below, Nokia Defendants do not thereby imply any restriction

as to which Exhibits F1-686A – F1-686K reference is primary and which Exhibits F1-686A – F1-686K reference is secondary in such a combination. Nokia Defendants reserve the right to rely on either identified reference in the identified combinations as a primary and/or secondary reference.

Reference	Combination References
U.S. Patent No. 6,606,719 to Ryckebusch (“Ryckebusch”)	Greszczuk, Rango, Milbrandt 603, Hughes-Hartogs, Telebit 2500, Wu, T1.413-1998, Golden ATU, Wiese, Speed Touch, and/or one or more references charted in Exhibit F1 Secondary-686
U.S. Patent No. 6,445,730 to Greszczuk (“Greszczuk”)	Ryckebusch, Rango, Milbrandt 603, Hughes-Hartogs, Telebit 2500, Wu, T1.413-1998, Golden ATU, Wiese, Speed Touch, and/or one or more references charted in Exhibit F1 Secondary-686
U.S. Patent No. 6,788,705 to “Rango”	Ryckebusch, Greszczuk, Milbrandt 603, Hughes-Hartogs, Telebit 2500, Wu, T1.413-1998, Golden ATU, Wiese, Speed Touch, and/or one or more references charted in Exhibit F1 Secondary-686
U.S. Patent No. 6,636,603 to Milbrandt (“Milbrandt 603”)	Ryckebusch, Greszczuk, Rango, Hughes-Hartogs, Telebit 2500, Wu, T1.413-1998, Golden ATU, Wiese, Speed Touch, and/or one or more references charted in Exhibit F1 Secondary-686
U.S. Patent No. 4,679,227 to Hughes-Hartogs (“Hughes-Hartogs”)	Ryckebusch, Greszczuk, Rango, Milbrandt 603, Telebit 2500, Wu, T1.413-1998, Golden ATU, Wiese, Speed Touch, and/or one or more references charted in Exhibit F1 Secondary-686
Telebit 2500 (“Telebit 2500”)	Ryckebusch, Greszczuk, Rango, Milbrandt 603, Hughes-Hartogs, Wu, T1.413-1998, Golden ATU, Wiese, Speed Touch, and/or one or more references charted in Exhibit F1 Secondary-686
U.S. Patent No. 6,219,378 to Wu (“Wu”)	Ryckebusch, Greszczuk, Rango, Milbrandt 603, Hughes-Hartogs, Telebit 2500, T1.413-1998, Golden ATU, Wiese, Speed Touch, and/or one or more references charted in Exhibit F1 Secondary-686

Network and Customer Installation Interfaces – Asymmetric Digital Subscriber Line (ADSL) Metallic Interface (“T1.413-1998”)	Ryckebusch, Greszczuk, Rango, Milbrandt 603, Hughes-Hartogs, Telebit 2500, Wu, Golden ATU, Wiese, Speed Touch, and/or one or more references charted in Exhibit F1 Secondary-686
SAD-Golden ATU-C (“Golden ATU”)	Ryckebusch, Greszczuk, Rango, Milbrandt 603, Hughes-Hartogs, Telebit 2500, Wu, T1.413-1998, Wiese, Speed Touch, and/or one or more references charted in Exhibit F1 Secondary-686
U.S. Patent No. 6,434,119 to Wiese (“Wiese”)	Ryckebusch, Greszczuk, Rango, Milbrandt 603, Hughes-Hartogs, Telebit 2500, Wu, T1.413-1998, Golden ATU, Speed Touch, and/or one or more references charted in Exhibit F1 Secondary-686
Speed Touch ADSL Modem (“Speed Touch”)	Ryckebusch, Greszczuk, Rango, Milbrandt 603, Hughes-Hartogs, Telebit 2500, Wu, T1.413-1998, Golden ATU, Wiese, and/or one or more references charted in Exhibit F1 Secondary-686

It would have been obvious to combine these references for reasons that are readily apparent to one of ordinary skill in the art, and for reasons explained herein.

c) Prior Art Solutions

In addition to the exemplary combinations provided above, to the extent TQ Delta alleges the references in Exhibits F1-686A – F1-686K and F1 Secondary-686 do not disclose any particular limitation of the Asserted Claims of the Family 1 Patent, either expressly or inherently, it would have been obvious to a person of ordinary skill in the art as of the alleged invention date of the Family 1 Patent to modify the references in Exhibits F1-686A – F1-686K and F1 Secondary-686 and/or combine the teachings of the references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with the other prior art references in Exhibits F1-686A – F1-686K and F1 Secondary-686 in a manner that would have rendered the Asserted Claims invalid as obvious. The

Nokia Defendants provide examples of such combinations below. The exemplary combinations below are non-exhaustive, and the Nokia Defendants reserve the right to rely on additional combinations as may be apparent from the prior art references in Exhibits F1-686A – F1-686K and F1 Secondary - 686. These obviousness combinations should not be construed to suggest that any reference included in any combination is not anticipatory in its own right.

(1) Exemplary Ryckebusch Solutions

A person of ordinary skill in the art would be motivated to combine Ryckebusch with Greszczuk for many reasons. For example, Ryckebusch describes a “method to estimate a transmission channel characteristic, the transmission channel characteristic estimating arrangement, and the remote terminal.” *See, e.g.*, Ryckebusch at 1:50-53. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ryckebusch to implement the details of “data to be communicated over the link is divided into groups of bits, one group for each subchannel” taught by Greszczuk because, it is also directed at “multicarrier transmission systems[s] for use in digital subscriber line communications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the DSL system “which is capable of rapid return to full operation.” Greszczuk at 3:18-20. In addition, a person of ordinary skill in the art would be motivated to combine Ryckenbusch with Greszczuk because (a) Ryckenbusch and Greszczuk disclose similar products, such as DSL systems; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Greszczuk’s teachings with those of Ryckenbusch. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ryckenbusch with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ryckebusch with Rango for many reasons. For example, Ryckebusch describes a “method to estimate a transmission channel characteristic, the transmission channel characteristic estimating arrangement, and the remote terminal.” *See, e.g.*, Ryckebusch at 1:50-53. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ryckebusch to implement the details of “diagnostic information [] passed over a more stable part of [a] channel” taught by Rango because, it is also directed at “transmission of information over a digital subscriber line (DSL).” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “rapid diagnosis of line problems and reduced human intervention, thereby saving both time and money in installing or operating DSL service.” Rango at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Ryckenbusch with Rango because (a) Ryckenbusch and Rango disclose similar products, such as DSL systems (b) Rango was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Rango’s teachings with those of Ryckenbusch. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ryckenbusch with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ryckebusch with Milbrandt 603 for many reasons. For example, Ryckebusch describes a “method to estimate a transmission channel characteristic, the transmission channel characteristic estimating arrangement, and the remote terminal.” *See, e.g.*, Ryckebusch at 1:50-53. A person having ordinary

skill in the art would have been motivated to modify the method and/or device of Ryckebusch to implement the details of “store[ing] noise information and cross-channel-coupling information for the first subscriber line and the second subscriber line” taught by Milbrandt 603 because, it is also directed at “digital subscriber lines.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “a system for determining the transmit power of a communication device operating on a twisted pair subscriber line includes a communication server coupled to a first subscriber line and a second subscriber line.” Milbrandt 603 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Ryckenbusch with Milbrandt 603 because (a) Ryckenbusch and Milbrandt 603 disclose similar products, such as DSL systems (b) Milbrandt 603 is assigned to Cisco Technology Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Milbrandt 603’s teachings with those of Ryckenbusch. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ryckenbusch with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ryckebusch with Hughes-Hartogs for many reasons. For example, Ryckebusch describes a “method to estimate a transmission channel characteristic, the transmission channel characteristic estimating arrangement, and the remote terminal.” *See, e.g.*, Ryckebusch at 1:50-53. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ryckebusch to implement the details of “allocating data and power among the carriers to compensate for equivalent noise and to maximize the data rate” taught by Hughes-Hartogs because, it is also

directed at “the field of data communications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “modem utilize[ing] a multicarrier modulation scheme and variably allocates data and power to the various carriers to maximize the overall data transmission rate.” Hughes-Hartogs at 2:43-49. In addition, a person of ordinary skill in the art would be motivated to combine Ryckenbusch with Hughes-Hartogs because (a) Ryckenbusch and Hughes-Hartogs disclose similar products, such as DSL systems (b) Hughes-Hartogs is assigned to Telebit Corp., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hughes-Hartogs’s teachings with those of Ryckenbusch. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ryckenbusch with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ryckenbusch with Telebit 2500 for many reasons. For example, Ryckenbusch describes a “method to estimate a transmission channel characteristic, the transmission channel characteristic estimating arrangement, and the remote terminal.” *See, e.g.*, Ryckenbusch at 1:50-53. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ryckenbusch to implement the details of an “error correction and detection protocol” taught by Telebit 2500 because, it is also directed at “high speed data transmission.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a modem with an error correction and detection protocol. Telebit 2500 at 1-1. In addition, a person of ordinary skill in the art would be motivated to combine Ryckenbusch with Telebit 2500 because (a) Ryckenbusch and

Telebit 2500 disclose similar products, such as DSL systems and modems (b) Telebit 2500 was manufactured by Telebit Corp., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Telebit 2500's teachings with those of Ryckenbusch. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ryckenbusch with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ryckenbusch with Wu for many reasons. For example, Ryckenbusch describes a “method to estimate a transmission channel characteristic, the transmission channel characteristic estimating arrangement, and the remote terminal.” *See, e.g.*, Ryckenbusch at 1:50-53. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ryckenbusch to implement the details of “measur[ing] the signal-to-noise ratio” taught by Wu because, it is also directed at “high-speed modem telecommunications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “data communications in which a remote and central office modem may initialize communications in order to maximize the available data communication rates and accuracy.” Wu at 3:4-8. In addition, a person of ordinary skill in the art would be motivated to combine Ryckenbusch with Wu because (a) Ryckenbusch and Wu disclose similar products, such as DSL systems (b) Wu is assigned to Texas Instruments, Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a

reasonable expectation of success in incorporating Wu's teachings with those of Ryckebusch. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ryckebusch with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ryckebusch with T1.413-1998 for many reasons. For example, Ryckebusch describes a “method to estimate a transmission channel characteristic, the transmission channel characteristic estimating arrangement, and the remote terminal.” *See, e.g.*, Ryckebusch at 1:50-53. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ryckebusch to implement the details of the “line code and the spectral composition of the signals transmitted by both ATU-C and ATU-R” taught by T1.413-1998 because, it is also directed at “digital subscriber line.” T1.413-1998 at 1. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “ensur[ing] the proper interfacing and interworking of ADSL transmission units”. T1.431-1998 at vi. In addition, a person of ordinary skill in the art would be motivated to combine Ryckebusch with T1.431-1998 because (a) Ryckebusch and T1.431-1998 disclose similar products, such as DSL systems (b) T1.431-1998 was published by American National Standards Institute, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating T1.413-1998's teachings with those of Ryckebusch. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ryckebusch with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ryckebusch with Golden ATU for many reasons. For example, Ryckebusch describes a “method to estimate a transmission channel characteristic, the transmission channel characteristic estimating arrangement, and the remote terminal.” *See, e.g.*, Ryckebusch at 1:50-53. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ryckebusch to implement the details of the “monitor[ing] line quality and modem performance” taught by Golden ATU because, it is also directed at “digital subscriber line.” Golden ATU at 9. A person of ordinary skill in the art would be motivated by the advantages of such functionality, “monitor[ing] line quality and modem performance”. Golden ATU at 9. In addition, a person of ordinary skill in the art would be motivated to combine Ryckebusch with Golden ATU because (a) Ryckebusch and Golden ATU disclose similar products, such as DSL systems (b) Golden ATU was designed by Alcatel, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Golden ATU’s teachings with those of Ryckebusch. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ryckebusch with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ryckebusch with Wiese for many reasons. For example, Ryckebusch describes a “method to estimate a transmission channel characteristic, the transmission channel characteristic estimating arrangement, and the remote terminal.” *See, e.g.*, Ryckebusch at 1:50-53. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ryckebusch to implement the details

of “initializing a connection between a remote modem and a central unit in a communication system that utilizes a multi-carrier modulation scheme” taught by Wiese because, it is also directed at “high-speed bi-directional communication systems.” Wiese at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “in the event that an error is detected, the unit that detects the error transmits designated error symbols which constitute a second predetermined pattern.” Wiese at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Ryckebusch with Wiese because (a) Ryckebusch and Wiese disclose similar products, such as DSL systems (b) Wiese is assigned to Texas Instruments, Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wiese’s teachings with those of Ryckebusch. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ryckebusch with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ryckebusch with Speed Touch for many reasons. For example, Ryckebusch describes a “method to estimate a transmission channel characteristic, the transmission channel characteristic estimating arrangement, and the remote terminal.” *See, e.g.*, Ryckebusch at 1:50-53. A person of ordinary skill in the art would be motivated to combine Ryckebusch with Speed Touch because (a) Ryckebusch and Speed Touch disclose similar products, such as DSL systems (b) Speed Touch was designed by Alcatel, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as

each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Speed Touch's teachings with those of Rykebusch. For similar reasons, a person of ordinary skill in the art would be motivated to combine Rykebusch with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

(2) Exemplary Greszczuk Solution

A person of ordinary skill in the art would be motivated to combine Greszczuk with Rykebusch for many reasons. For example, Greszczuk describes a “multicarrier transmission system[] [that] provides high speed data links between connection points.” See, e.g., Greszczuk at 1:15-25. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Greszczuk to implement the details of “a method to estimate a transmission channel characteristic,” taught by Rykebusch because, it is also directed at “digital subscriber line” systems. Rykebusch at 1:5-10. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the DSL system “multiplexing the collected information that will be used for transmission channel characterisation with user data, a transmission channel can be characterised without interruption of the system.” Rykebusch at 2:34-41. In addition, a person of ordinary skill in the art would be motivated to combine Greszczuk with Rykebusch because (a) Rykebusch and Greszczuk disclose similar products, such as DSL systems; (b) Rykebusch is assigned to Alcatel Lucent SAS, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Rykebusch's teachings with those of Greszczuk. For similar reasons, a

person of ordinary skill in the art would be motivated to combine Greszczuk with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Greszczuk with Rango for many reasons. For example, Greszczuk describes a “multicarrier transmission system[] [that] provides high speed data links between connection points.” *See, e.g.*, Greszczuk at 1:15-25. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Greszczuk to implement the details of “diagnostic information [] passed over a more stable part of [a] channel” taught by Rango because, it is also directed at “transmission of information over a digital subscriber line (DSL).” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “rapid diagnosis of line problems and reduced human intervention, thereby saving both time and money in installing or operating DSL service.” Rango at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Greszczuk with Rango because (a) Greszczuk and Rango disclose similar products, such as DSL systems (b) Rango was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Rango’s teachings with those of Greszczuk. For similar reasons, a person of ordinary skill in the art would be motivated to combine Greszczuk with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Greszczuk with Milbrandt 603 for many reasons. For example, Greszczuk describes a “multicarrier transmission

system[] [that] provides high speed data links between connection points.” *See, e.g.,* Greszczuk at 1:15-25. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Greszczuk to implement the details of “store[ing] noise information and cross-channel-coupling information for the first subscriber line and the second subscriber line” taught by Milbrandt 603 because, it is also directed at “digital subscriber lines.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “a system for determining the transmit power of a communication device operating on a twisted pair subscriber line includes a communication server coupled to a first subscriber line and a second subscriber line.” Milbrandt 603 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Greszczuk with Milbrandt 603 because (a) Greszczuk and Milbrandt 603 disclose similar products, such as DSL systems (b) Milbrandt 603 is assigned to Cisco Technology Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Milbrandt 603’s teachings with those of Greszczuk. For similar reasons, a person of ordinary skill in the art would be motivated to combine Greszczuk with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Greszczuk with Hughes-Hartogs for many reasons. For example, Greszczuk describes a “multicarrier transmission system[] [that] provides high speed data links between connection points.” *See, e.g.,* Greszczuk at 1:15-25. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Greszczuk to implement the details of “allocating data and power among the

carriers to compensate for equivalent noise and to maximize the data rate” taught by Hughes-Hartogs because, it is also directed at “the field of data communications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “modem utilize[ing] a multicarrier modulation scheme and variably allocates data and power to the various carriers to maximize the overall data transmission rate.” Hughes-Hartogs at 2:43-49. In addition, a person of ordinary skill in the art would be motivated to combine Greszczuk with Hughes-Hartogs because (a) Greszczuk and Hughes-Hartogs disclose similar products, such as DSL systems (b) Hughes-Hartogs is assigned to Telebit Corp., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hughes-Hartogs’s teachings with those of Greszczuk. For similar reasons, a person of ordinary skill in the art would be motivated to combine Greszczuk with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Greszczuk with Telebit 2500 for many reasons. For example, Greszczuk describes a “multicarrier transmission system[] [that] provides high speed data links between connection points.” *See, e.g.*, Greszczuk at 1:15-25. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Greszczuk to implement the details of an “error correction and detection protocol” taught by Telebit 2500 because, it is also directed at “high speed data transmission.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a modem with an error correction and detection protocol. Telebit 2500 at 1-1. In addition, a person of ordinary skill in the art would be motivated to combine Greszczuk with Telebit 2500 because (a) Greszczuk

and Telebit 2500 disclose similar products, such as DSL systems and modems (b) Telebit 2500 was manufactured by Telebit Corp., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Telebit 2500's teachings with those of Greszczuk. For similar reasons, a person of ordinary skill in the art would be motivated to combine Greszczuk with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Greszczuk with Wu for many reasons. For example, Greszczuk describes a “multicarrier transmission system[] [that] provides high speed data links between connection points.” *See, e.g.*, Greszczuk at 1:15-25. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Greszczuk to implement the details of “measur[ing] the signal-to-noise ratio” taught by Wu because, it is also directed at “high-speed modem telecommunications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “data communications in which a remote and central office modem may initialize communications in order to maximize the available data communication rates and accuracy.” Wu at 3:4-8. In addition, a person of ordinary skill in the art would be motivated to combine Greszczuk with Wu because (a) Greszczuk and Wu disclose similar products, such as DSL systems (b) Wu is assigned to Texas Instruments, Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wu's teachings with

those of Greszczuk. For similar reasons, a person of ordinary skill in the art would be motivated to combine Greszczuk with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Greszczuk with T1.413-1998 for many reasons. For example, Greszczuk describes a “multicarrier transmission system[] [that] provides high speed data links between connection points.” See, e.g., Greszczuk at 1:15-25. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Greszczuk to implement the details of the “line code and the spectral composition of the signals transmitted by both ATU-C and ATU-R” taught by T1.413-1998 because, it is also directed at “digital subscriber line.” T1.413-1998 at 1. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “ensur[ing] the proper interfacing and interworking of ADSL transmission units”. T1.431-1998 at vi. In addition, a person of ordinary skill in the art would be motivated to combine Greszczuk with T1.431-1998 because (a) Greszczuk and T1.431-1998 disclose similar products, such as DSL systems (b) T1.431-1998 was published by American National Standards Institute, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating T1.413-1998’s teachings with those of Greszczuk. For similar reasons, a person of ordinary skill in the art would be motivated to combine Greszczuk with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Greszczuk with Golden ATU for many reasons. For example, Greszczuk describes a “multicarrier transmission system[]

[that] provides high speed data links between connection points.” See, e.g., Greszczuk at 1:15-25. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Greszczuk to implement the details of the “monitor[ing] line quality and modem performance” taught by Golden ATU because, it is also directed at “digital subscriber line.” Golden ATU at 9. A person of ordinary skill in the art would be motivated by the advantages of such functionality, “monitor[ing] line quality and modem performance”. Golden ATU at 9. In addition, a person of ordinary skill in the art would be motivated to combine Greszczuk with Golden ATU because (a) Greszczuk and Golden ATU disclose similar products, such as DSL systems (b) Golden ATU was designed by Alcatel, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Golden ATU’s teachings with those of Greszczuk. For similar reasons, a person of ordinary skill in the art would be motivated to combine Greszczuk with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Greszczuk with Wiese for many reasons. For example, Greszczuk describes a “multicarrier transmission system[] [that] provides high speed data links between connection points.” See, e.g., Greszczuk at 1:15-25. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Greszczuk to implement the details of “initializing a connection between a remote modem and a central unit in a communication system that utilizes a multi-carrier modulation scheme” taught by Weise because, it is also directed at “high-speed bi-directional communication systems.” Wiese at Abstract. A person of ordinary skill in the art would be motivated by the

advantages of such functionality, such as a “in the event that an error is detected, the unit that detects the error transmits designated error symbols which constitute a second predetermined pattern.” Wiese at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Greszczuk with Wiese because (a) Greszczuk and Wiese disclose similar products, such as DSL systems (b) Wiese is assigned to Texas Instruments, Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wiese’s teachings with those of Greszczuk. For similar reasons, a person of ordinary skill in the art would be motivated to combine Greszczuk with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Greszczuk with Speed Touch for many reasons. For example, Greszczuk describes a “multicarrier transmission system[] [that] provides high speed data links between connection points.” *See, e.g.*, Greszczuk at 1:15-25. A person of ordinary skill in the art would be motivated to combine Greszczuk with Speed Touch because (a) Greszczuk and Speed Touch disclose similar products, such as DSL systems (b) Speed Touch was designed by Alcatel, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Speed Touch’s teachings with those of Greszczuk. For similar reasons, a person of ordinary skill in the art would be motivated combine Greszczuk with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

(3) Exemplary Rango Solution

A person of ordinary skill in the art would be motivated to combine Rango with Ryckebusch for many reasons. For example, Rango describes “a rapid diagnosis of line problems and reduced human intervention, thereby saving both time and money in installing or operating DSL service.” Rango at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Rango to implement the details of “a method to estimate a transmission channel characteristic,” taught by Ryckebusch because, it is also directed at “digital subscriber line” systems. Ryckebusch at 1:5-10. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the DSL system “multiplexing the collected information that will be used for transmission channel characterisation with user data, a transmission channel can be characterised without interruption of the system.” Ryckebusch at 2:34-41. In addition, a person of ordinary skill in the art would be motivated to combine Rango with Ryckebusch because (a) Ryckebusch and Rango disclose similar products, such as DSL systems; (b) Ryckebusch is assigned to Alcatel Lucent SAS, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ryckebusch’s teachings with those of Rango. For similar reasons, a person of ordinary skill in the art would be motivated to combine Rango with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Rango with Greszczuk for many reasons. For example, Rango describes “a rapid diagnosis of line problems and reduced human intervention, thereby saving both time and money in installing or operating DSL service.”

Rango at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Rango to implement the details of “data to be communicated over the link is divided into groups of bits, one group for each subchannel” taught by Greszczuk because, it is also directed at “multicarrier transmission systems[s] for use in digital subscriber line communications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the DSL system “which is capable of rapid return to full operation.” Greszczuk at 3:18-20. In addition, a person of ordinary skill in the art would be motivated to combine Rango with Greszczuk because (a) Rango and Greszczuk disclose similar products, such as DSL systems; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Greszczuk’s teachings with those of Rango. For similar reasons, a person of ordinary skill in the art would be motivated to combine Rango with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Rango with Milbrandt 603 for many reasons. For example, Rango describes “a rapid diagnosis of line problems and reduced human intervention, thereby saving both time and money in installing or operating DSL service.” Rango at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Rango to implement the details of “store[ing] noise information and cross-channel-coupling information for the first subscriber line and the second subscriber line” taught by Milbrandt 603 because, it is also directed at “digital subscriber lines.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “a system for determining the transmit power of a communication device operating on a twisted pair subscriber line includes a communication server coupled to a first subscriber line and

a second subscriber line.” Milbrandt 603 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Rango with Milbrandt 603 because (a) Rango and Milbrandt 603 disclose similar products, such as DSL systems (b) Milbrandt 603 is assigned to Cisco Technology Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Milbrandt 603’s teachings with those of Rango. For similar reasons, a person of ordinary skill in the art would be motivated to combine Rango with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Rango with Hughes-Hartogs for many reasons. For example, Rango describes “a rapid diagnosis of line problems and reduced human intervention, thereby saving both time and money in installing or operating DSL service.” Rango at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Rango to implement the details of “allocating data and power among the carriers to compensate for equivalent noise and to maximize the data rate” taught by Hughes-Hartogs because, it is also directed at “the field of data communications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “modem utilize[ing] a multicarrier modulation scheme and variably allocates data and power to the various carriers to maximize the overall data transmission rate.” Hughes-Hartogs at 2:43-49. In addition, a person of ordinary skill in the art would be motivated to combine Rango with Hughes-Hartogs because (a) Rango and Hughes-Hartogs disclose similar products, such as DSL systems (b) Hughes-Hartogs is assigned to Telebit Corp., a leader in the industry to which a person

of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hughes-Hartogs's teachings with those of Rango. For similar reasons, a person of ordinary skill in the art would be motivated to combine Rango with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Rango with Telebit 2500 for many reasons. For example, Rango describes “a rapid diagnosis of line problems and reduced human intervention, thereby saving both time and money in installing or operating DSL service.” Rango at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Rango to implement the details of an “error correction and detection protocol” taught by Telebit 2500 because, it is also directed at “high speed data transmission.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a modem with an error correction and detection protocol. Telebit 2500 at 1-1. In addition, a person of ordinary skill in the art would be motivated to combine Rango with Telebit 2500 because (a) Rango and Telebit 2500 disclose similar products, such as DSL systems and modems (b) Telebit 2500 was manufactured by Telebit Corp., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Telebit 2500's teachings with those of Rango. For similar reasons, a person of ordinary skill in the art would be motivated to combine Rango with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Rango with Wu for many reasons. For example, Rango describes “a rapid diagnosis of line problems and reduced human intervention, thereby saving both time and money in installing or operating DSL service.” Rango at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Rango to implement the details of “measur[ing] the signal-to-noise ratio” taught by Wu because, it is also directed at “high-speed modem telecommunications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “data communications in which a remote and central office modem may initialize communications in order to maximize the available data communication rates and accuracy.” Wu at 3:4-8. In addition, a person of ordinary skill in the art would be motivated to combine Rango with Wu because (a) Rango and Wu disclose similar products, such as DSL systems (b) Wu is assigned to Texas Instruments, Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wu’s teachings with those of Rango. For similar reasons, a person of ordinary skill in the art would be motivated to combine Rango with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Rango with T1.413-1998 for many reasons. For example, Rango describes “a rapid diagnosis of line problems and reduced human intervention, thereby saving both time and money in installing or operating DSL service.” Rango at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Rango to implement the details of the “line code and the

spectral composition of the signals transmitted by both ATU-C and ATU-R” taught by T1.413-1998 because, it is also directed at “digital subscriber line.” T1.413-1998 at 1. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “ensur[ing] the proper interfacing and interworking of ADSL transmission units”. T1.431-1998 at vi. In addition, a person of ordinary skill in the art would be motivated to combine Rango with T1.431-1998 because (a) Rango and T1.431-1998 disclose similar products, such as DSL systems (b) T1.431-1998 was published by American National Standards Institute, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating T1.413-1998’s teachings with those of Rango. For similar reasons, a person of ordinary skill in the art would be motivated to combine Rango with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Rango with Golden ATU for many reasons. For example, Rango describes “a rapid diagnosis of line problems and reduced human intervention, thereby saving both time and money in installing or operating DSL service.” Rango at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Rango to implement the details of the “monitor[ing] line quality and modem performance” taught by Golden ATU because, it is also directed at “digital subscriber line.” Golden ATU at 9. A person of ordinary skill in the art would be motivated by the advantages of such functionality, “monitor[ing] line quality and modem performance”. Golden ATU at 9. In addition, a person of ordinary skill in the art would be motivated to combine Rango with Golden ATU because (a) Rango and Golden ATU disclose similar products, such as DSL

systems (b) Golden ATU was designed by Alcatel, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Golden ATU's teachings with those of Rango. For similar reasons, a person of ordinary skill in the art would be motivated to combine Rango with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Rango with Wiese for many reasons. For example, Rango describes “a rapid diagnosis of line problems and reduced human intervention, thereby saving both time and money in installing or operating DSL service.” Rango at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Rango to implement the details of “initializing a connection between a remote modem and a central unit in a communication system that utilizes a multi-carrier modulation scheme” taught by Weise because, it is also directed at “high-speed bi-directional communication systems.” Wiese at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “in the event that an error is detected, the unit that detects the error transmits designated error symbols which constitute a second predetermined pattern.” Wiese at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Rango with Wiese because (a) Rango and Wiese disclose similar products, such as DSL systems (b) Wiese is assigned to Texas Instruments, Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a

reasonable expectation of success in incorporating Wiese's teachings with those of Rango. For similar reasons, a person of ordinary skill in the art would be motivated to combine Rango with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Rango with Speed Touch for many reasons. For example, Rango describes "a rapid diagnosis of line problems and reduced human intervention, thereby saving both time and money in installing or operating DSL service." Rango at Abstract. A person of ordinary skill in the art would be motivated to combine Rango with Speed Touch because (a) Rango and Speed Touch disclose similar products, such as DSL systems (b) Speed Touch was designed by Alcatel, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Speed Touch's teachings with those of Rango. For similar reasons, a person of ordinary skill in the art would be motivated combine Rango with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

(4) Exemplary Milbrandt 603 Solution

A person of ordinary skill in the art would be motivated to combine Milbrandt 603 with Ryckebusch for many reasons. For example, Milbrandt 603 describes "a system for determining the transmit power of a communication device operating on a twisted pair subscriber line includes a communication server coupled to a first subscriber line and a second subscriber line." Milbrandt 603 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Milbrandt 603 to implement the details of "a method to estimate a transmission channel characteristic," taught by Ryckebusch because, it is also directed at "digital

subscriber line” systems. Ryckebusch at 1:5-10. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the DSL system “multiplexing the collected information that will be used for transmission channel characterisation with user data, a transmission channel can be characterised without interruption of the system.” Ryckebusch at 2:34-41. In addition, a person of ordinary skill in the art would be motivated to combine Milbrandt 603 with Ryckebusch because (a) Ryckebusch and Milbrandt 603 disclose similar products, such as DSL systems; (b) Ryckebusch is assigned to Alcatel Lucent SAS, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ryckebusch’s teachings with those of Milbrandt 603. For similar reasons, a person of ordinary skill in the art would be motivated to combine Milbrandt 603 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Milbrandt 603 with Greszczuk for many reasons. For example, Milbrandt 603 describes “a system for determining the transmit power of a communication device operating on a twisted pair subscriber line includes a communication server coupled to a first subscriber line and a second subscriber line.” Milbrandt 603 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Milbrandt 603 to implement the details of “data to be communicated over the link is divided into groups of bits, one group for each subchannel” taught by Greszczuk because, it is also directed at “multicarrier transmission systems[s] for use in digital subscriber line communications.” A person of ordinary skill in the art would be motivated by the advantages of

such functionality, such as the DSL system “which is capable of rapid return to full operation.” Greszczuk at 3:18-20. In addition, a person of ordinary skill in the art would be motivated to combine Milbrandt 603 with Greszczuk because (a) Milbrandt 603 and Greszczuk disclose similar products, such as DSL systems; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Greszczuk’s teachings with those of Milbrandt 603. For similar reasons, a person of ordinary skill in the art would be motivated to combine Milbrandt 603 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Milbrandt 603 with Rango for many reasons. For example, Milbrandt 603 describes “a system for determining the transmit power of a communication device operating on a twisted pair subscriber line includes a communication server coupled to a first subscriber line and a second subscriber line.” Milbrandt 603 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Milbrandt 603 to implement the details of “diagnostic information [] passed over a more stable part of [a] channel” taught by Rango because, it is also directed at “transmission of information over a digital subscriber line (DSL).” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “rapid diagnosis of line problems and reduced human intervention, thereby saving both time and money in installing or operating DSL service.” Rango at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Milbrandt 603 with Rango because (a) Milbrandt 603 and Rango disclose similar products, such as DSL systems (b) Rango was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to

improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Rango's teachings with those of Milbrandt 603. For similar reasons, a person of ordinary skill in the art would be motivated to combine Milbrandt 603 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Milbrandt 603 with Hughes-Hartog for many reasons. For example, Milbrandt 603 describes “a system for determining the transmit power of a communication device operating on a twisted pair subscriber line includes a communication server coupled to a first subscriber line and a second subscriber line.” Milbrandt 603 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Milbrandt 603 to implement the details of “allocating data and power among the carriers to compensate for equivalent noise and to maximize the data rate” taught by Hughes-Hartogs because, it is also directed at “the field of data communications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “modem utilize[ing] a multicarrier modulation scheme and variably allocates data and power to the various carriers to maximize the overall data transmission rate.” Hughes-Hartogs at 2:43-49. In addition, a person of ordinary skill in the art would be motivated to combine Milbrandt 603 with Hughes-Hartogs because (a) Milbrandt 603 and Hughes-Hartogs disclose similar products, such as DSL systems (b) Hughes-Hartogs is assigned to Telebit Corp., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of

success in incorporating Hughes-Hartogs's teachings with those of Milbrandt 603. For similar reasons, a person of ordinary skill in the art would be motivated to combine Milbrandt 603 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Milbrandt 603 with Telebit 2500 for many reasons. For example, Milbrandt 603 describes “a system for determining the transmit power of a communication device operating on a twisted pair subscriber line includes a communication server coupled to a first subscriber line and a second subscriber line.” Milbrandt 603 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Milbrandt 603 to implement the details of an “error correction and detection protocol” taught by Telebit 2500 because, it is also directed at “high speed data transmission.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a modem with an error correction and detection protocol. Telebit 2500 at 1-1. In addition, a person of ordinary skill in the art would be motivated to combine Milbrandt 603 with Telebit 2500 because (a) Milbrandt 603 and Telebit 2500 disclose similar products, such as DSL systems and modems (b) Telebit 2500 was manufactured by Telebit Corp., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Telebit 2500's teachings with those of Milbrandt 603. For similar reasons, a person of ordinary skill in the art would be motivated to combine Milbrandt 603 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Milbrandt 603 with Wu for many reasons. For example, Milbrandt 603 describes “a system for determining the transmit power of a communication device operating on a twisted pair subscriber line includes a communication server coupled to a first subscriber line and a second subscriber line.” Milbrandt 603 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Milbrandt 603 to implement the details of “measur[ing] the signal-to-noise ratio” taught by Wu because, it is also directed at “high-speed modem telecommunications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “data communications in which a remote and central office modem may initialize communications in order to maximize the available data communication rates and accuracy.” Wu at 3:4-8. In addition, a person of ordinary skill in the art would be motivated to combine Milbrandt 603 with Wu because (a) Milbrandt 603 and Wu disclose similar products, such as DSL systems (b) Wu is assigned to Texas Instruments, Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wu’s teachings with those of Milbrandt 603. For similar reasons, a person of ordinary skill in the art would be motivated to combine Milbrandt 603 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Milbrandt 603 with T1.413-1998 for many reasons. For example, Milbrandt 603 describes “a system for determining the transmit power of a communication device operating on a twisted pair subscriber line includes a communication server coupled to a first subscriber line and a second subscriber line.” Milbrandt

603 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Milbrandt 603 to implement the details of the “line code and the spectral composition of the signals transmitted by both ATU-C and ATU-R” taught by T1.413-1998 because, it is also directed at “digital subscriber line.” T1.413-1998 at 1. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “ensur[ing] the proper interfacing and interworking of ADSL transmission units”. T1.431-1998 at vi. In addition, a person of ordinary skill in the art would be motivated to combine Milbrandt 603 with T1.431-1998 because (a) Milbrandt 603 and T1.431-1998 disclose similar products, such as DSL systems (b) T1.431-1998 was published by American National Standards Institute, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating T1.413-1998’s teachings with those of Milbrandt 603. For similar reasons, a person of ordinary skill in the art would be motivated to combine Milbrandt 603 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Milbrandt 603 with Golden ATU for many reasons. For example, Milbrandt 603 describes “a system for determining the transmit power of a communication device operating on a twisted pair subscriber line includes a communication server coupled to a first subscriber line and a second subscriber line.” Milbrandt 603 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Milbrandt 603 to implement the details of the “monitor[ing] line quality and modem performance” taught by Golden ATU because, it is also directed at “digital

subscriber line.” Golden ATU at 9. A person of ordinary skill in the art would be motivated by the advantages of such functionality, “monitor[ing] line quality and modem performance”. Golden ATU at 9. In addition, a person of ordinary skill in the art would be motivated to combine Milbrandt 603 with Golden ATU because (a) Milbrandt 603 and Golden ATU disclose similar products, such as DSL systems (b) Golden ATU was designed by Alcatel, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Golden ATU’s teachings with those of Milbrandt 603. For similar reasons, a person of ordinary skill in the art would be motivated to combine Milbrandt 603 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Milbrandt 603 with Wiese for many reasons. For example, Milbrandt 603 describes “a system for determining the transmit power of a communication device operating on a twisted pair subscriber line includes a communication server coupled to a first subscriber line and a second subscriber line.” Milbrandt 603 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Milbrandt 603 to implement the details of “initializing a connection between a remote modem and a central unit in a communication system that utilizes a multi-carrier modulation scheme” taught by Weise because, it is also directed at “high-speed bi-directional communication systems.” Wiese at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “in the event that an error is detected, the unit that detects the error transmits designated error symbols which constitute a second

predetermined pattern.” Wiese at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Milbrandt 603 with Wiese because (a) Milbrandt 603 and Wiese disclose similar products, such as DSL systems (b) Wiese is assigned to Texas Instruments, Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wiese’s teachings with those of Milbrandt 603. For similar reasons, a person of ordinary skill in the art would be motivated to combine Milbrandt 603 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Milbrandt 603 with Speed Touch for many reasons. For example, Milbrandt 603 describes “a system for determining the transmit power of a communication device operating on a twisted pair subscriber line includes a communication server coupled to a first subscriber line and a second subscriber line.” Milbrandt 603 at Abstract. A person of ordinary skill in the art would be motivated to combine Milbrandt 603 with Speed Touch because (a) Milbrandt 603 and Speed Touch disclose similar products, such as DSL systems (b) Speed Touch was designed by Alcatel, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Speed Touch’s teachings with those of Milbrandt 603. For similar reasons, a person of ordinary skill in the art would be motivated combine Milbrandt 603

with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

(5) Exemplary Hughes-Hartogs Solution

A person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with Ryckebusch for many reasons. For example, Hughes-Hartogs describes “allocating data and power among the carriers to compensate for equivalent noise and to maximize the data rate.” Hughes-Hartogs at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Hughes-Hartogs to implement the details of “a method to estimate a transmission channel characteristic,” taught by Ryckebusch because, it is also directed at “digital subscriber line” systems. Ryckebusch at 1:5-10. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the DSL system “multiplexing the collected information that will be used for transmission channel characterisation with user data, a transmission channel can be characterised without interruption of the system.” Ryckebusch at 2:34-41. In addition, a person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with Ryckebusch because (a) Ryckebusch and Hughes-Hartogs disclose similar products, such as DSL systems; (b) Ryckebusch is assigned to Alcatel Lucent SAS, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ryckebusch’s teachings with those of Hughes-Hartogs. For similar reasons, a person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with Greszczuk for many reasons. For example, Hughes-Hartogs describes “allocating data and power among the carriers to compensate for equivalent noise and to maximize the data rate.” Hughes-Hartogs at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Hughes-Hartogs to implement the details of “data to be communicated over the link is divided into groups of bits, one group for each subchannel” taught by Greszczuk because, it is also directed at “multicarrier transmission systems[s] for use in digital subscriber line communications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the DSL system “which is capable of rapid return to full operation.” Greszczuk at 3:18-20. In addition, a person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with Greszczuk because (a) Hughes-Hartogs and Greszczuk disclose similar products, such as DSL systems; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Greszczuk’s teachings with those of Hughes-Hartogs. For similar reasons, a person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with Rango for many reasons. For example, Hughes-Hartogs describes “allocating data and power among the carriers to compensate for equivalent noise and to maximize the data rate.” Hughes-Hartogs at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Hughes-Hartogs to implement the details of “diagnostic information [] passed over a more stable part of [a] channel” taught by Rango because, it is also directed at

“transmission of information over a digital subscriber line (DSL).” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “rapid diagnosis of line problems and reduced human intervention, thereby saving both time and money in installing or operating DSL service.” Rango at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with Rango because (a) Hughes-Hartogs and Rango disclose similar products, such as DSL systems (b) Rango was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Rango’s teachings with those of Hughes-Hartogs. For similar reasons, a person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with Milbrandt 603 for many reasons. For example, Hughes-Hartogs describes “allocating data and power among the carriers to compensate for equivalent noise and to maximize the data rate.” Hughes-Hartogs at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Hughes-Hartogs to implement the details of “store[ing] noise information and cross-channel-coupling information for the first subscriber line and the second subscriber line” taught by Milbrandt 603 because, it is also directed at “digital subscriber lines.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “a system for determining the transmit power of a communication device operating on a twisted pair subscriber line includes a communication server coupled to a first

subscriber line and a second subscriber line.” Milbrandt 603 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with Milbrandt 603 because (a) Hughes-Hartogs and Milbrandt 603 disclose similar products, such as DSL systems (b) Milbrandt 603 is assigned to Cisco Technology Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Milbrandt 603’s teachings with those of Hughes-Hartogs. For similar reasons, a person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with Telebit 2500 for many reasons. For example, Hughes-Hartogs describes “allocating data and power among the carriers to compensate for equivalent noise and to maximize the data rate.” Hughes-Hartogs at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Hughes-Hartogs to implement the details of an “error correction and detection protocol” taught by Telebit 2500 because, it is also directed at “high speed data transmission.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a modem with an error correction and detection protocol. Telebit 2500 at 1-1. In addition, a person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with Telebit 2500 because (a) Hughes-Hartogs and Telebit 2500 disclose similar products, such as DSL systems and modems (b) Telebit 2500 was manufactured by Telebit Corp., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as

each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Telebit 2500's teachings with those of Hughes-Hartogs. For similar reasons, a person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with Wu for many reasons. For example, Hughes-Hartogs describes “allocating data and power among the carriers to compensate for equivalent noise and to maximize the data rate.” Hughes-Hartogs at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Hughes-Hartogs to implement the details of “measur[ing] the signal-to-noise ratio” taught by Wu because, it is also directed at “high-speed modem telecommunications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “data communications in which a remote and central office modem may initialize communications in order to maximize the available data communication rates and accuracy.” Wu at 3:4-8. In addition, a person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with Wu because (a) Hughes-Hartogs and Wu disclose similar products, such as DSL systems (b) Wu is assigned to Texas Instruments, Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wu's teachings with those of Hughes-Hartogs. For similar reasons, a person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with T1.413-1998 for many reasons. For example, Hughes-Hartogs describes “allocating data and power among the carriers to compensate for equivalent noise and to maximize the data rate.” Hughes-Hartogs at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Hughes-Hartogs to implement the details of the “line code and the spectral composition of the signals transmitted by both ATU-C and ATU-R” taught by T1.413-1998 because, it is also directed at “digital subscriber line.” T1.413-1998 at 1. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “ensur[ing] the proper interfacing and interworking of ADSL transmission units”. T1.431-1998 at vi. In addition, a person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with T1.431-1998 because (a) Hughes-Hartogs and T1.431-1998 disclose similar products, such as DSL systems (b) T1.431-1998 was published by American National Standards Institute, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating T1.413-1998’s teachings with those of Hughes-Hartogs. For similar reasons, a person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with Golden ATU for many reasons. For example, Hughes-Hartogs describes “allocating data and power among the carriers to compensate for equivalent noise and to maximize the data rate.” Hughes-Hartogs at Abstract. A person having ordinary skill in the art would have been motivated

to modify the method and/or device of Hughes-Hartogs to implement the details of the “monitor[ing] line quality and modem performance” taught by Golden ATU because, it is also directed at “digital subscriber line.” Golden ATU at 9. A person of ordinary skill in the art would be motivated by the advantages of such functionality, “monitor[ing] line quality and modem performance”. Golden ATU at 9. In addition, a person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with Golden ATU because (a) Hughes-Hartogs and Golden ATU disclose similar products, such as DSL systems (b) Golden ATU was designed by Alcatel, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Golden ATU’s teachings with those of Hughes-Hartogs. For similar reasons, a person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with Wiese for many reasons. For example, Hughes-Hartogs describes “allocating data and power among the carriers to compensate for equivalent noise and to maximize the data rate.” Hughes-Hartogs at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Hughes-Hartogs to implement the details of “initializing a connection between a remote modem and a central unit in a communication system that utilizes a multi-carrier modulation scheme” taught by Weise because, it is also directed at “high-speed bi-directional communication systems.” Wiese at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “in the event that an error is detected,

the unit that detects the error transmits designated error symbols which constitute a second predetermined pattern.” Wiese at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with Wiese because (a) Hughes-Hartogs and Wiese disclose similar products, such as DSL systems (b) Wiese is assigned to Texas Instruments, Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wiese’s teachings with those of Hughes-Hartogs. For similar reasons, a person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with Speed Touch for many reasons. For example, Hughes-Hartogs describes “allocating data and power among the carriers to compensate for equivalent noise and to maximize the data rate.” Hughes-Hartogs at Abstract. A person of ordinary skill in the art would be motivated to combine Hughes-Hartogs with Speed Touch because (a) Hughes-Hartogs and Speed Touch disclose similar products, such as DSL systems (b) Speed Touch was designed by Alcatel, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Speed Touch’s teachings with those of Hughes-Hartogs. For similar reasons, a person of ordinary skill in the art would be motivated combine Hughes-

Hartogs with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

(6) Exemplary Telebit 2500 Solution

A person of ordinary skill in the art would be motivated to combine Telebit 2500 with Ryckebusch for many reasons. For example, Telebit 2500 describes “error correction and detection protocol.” Telebit 2500 at 191. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Telebit 2500 to implement the details of “a method to estimate a transmission channel characteristic,” taught by Ryckebusch because, it is also directed at “digital subscriber line” systems. Ryckebusch at 1:5-10. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the DSL system “multiplexing the collected information that will be used for transmission channel characterisation with user data, a transmission channel can be characterised without interruption of the system.” Ryckebusch at 2:34-41. In addition, a person of ordinary skill in the art would be motivated to combine Telebit 2500 with Ryckebusch because (a) Ryckebusch and Telebit 2500 disclose similar products, such as DSL systems; (b) Ryckebusch is assigned to Alcatel Lucent SAS, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ryckebusch’s teachings with those of Telebit 2500. For similar reasons, a person of ordinary skill in the art would be motivated to combine Telebit 2500 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Telebit 2500 with Greszczuk for many reasons. For example, Telebit 2500 describes “error correction and detection protocol.” Telebit 2500 at 191. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Telebit 2500 to implement the details of “data to be communicated over the link is divided into groups of bits, one group for each subchannel” taught by Greszczuk because, it is also directed at “multicarrier transmission systems[s] for use in digital subscriber line communications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the DSL system “which is capable of rapid return to full operation.” Greszczuk at 3:18-20. In addition, a person of ordinary skill in the art would be motivated to combine Telebit 2500 with Greszczuk because (a) Telebit 2500 and Greszczuk disclose similar products, such as DSL systems; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Greszczuk’s teachings with those of Telebit 2500. For similar reasons, a person of ordinary skill in the art would be motivated to combine Telebit 2500 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Telebit 2500 with Rango for many reasons. For example, Telebit 2500 describes “error correction and detection protocol.” Telebit 2500 at 191. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Telebit 2500 to implement the details of “diagnostic information [] passed over a more stable part of [a] channel” taught by Rango because, it is also directed at “transmission of information over a digital subscriber line (DSL).” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “rapid

diagnosis of line problems and reduced human intervention, thereby saving both time and money in installing or operating DSL service.” Rango at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Telebit 2500 with Rango because (a) Telebit 2500 and Rango disclose similar products, such as DSL systems (b) Rango was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Rango’s teachings with those of Telebit 2500. For similar reasons, a person of ordinary skill in the art would be motivated to combine Telebit 2500 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Telebit 2500 with Milbrandt 603 for many reasons. For example, Telebit 2500 describes “error correction and detection protocol.” Telebit 2500 at 191. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Telebit 2500 to implement the details of “store[ing] noise information and cross-channel-coupling information for the first subscriber line and the second subscriber line” taught by Milbrandt 603 because, it is also directed at “digital subscriber lines.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “a system for determining the transmit power of a communication device operating on a twisted pair subscriber line includes a communication server coupled to a first subscriber line and a second subscriber line.” Milbrandt 603 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Telebit 2500 with Milbrandt 603 because (a) Telebit 2500 and Milbrandt 603 disclose similar products, such as DSL systems (b) Milbrandt

603 is assigned to Cisco Technology Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Milbrandt 603's teachings with those of Telebit 2500. For similar reasons, a person of ordinary skill in the art would be motivated to combine Telebit 2500 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Telebit 2500 with Hughes-Hartogs for many reasons. For example, Telebit 2500 describes "error correction and detection protocol." Telebit 2500 at 191. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Telebit 2500 to implement the details of "allocating data and power among the carriers to compensate for equivalent noise and to maximize the data rate" taught by Hughes-Hartogs because, it is also directed at "the field of data communications." A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a "modem utilize[ing] a multicarrier modulation scheme and variably allocates data and power to the various carriers to maximize the overall data transmission rate." Hughes-Hartogs at 2:43-49. In addition, a person of ordinary skill in the art would be motivated to combine Telebit 2500 with Hughes-Hartogs because (a) Telebit 2500 and Hughes-Hartogs disclose similar products, such as DSL systems (b) Hughes-Hartogs is assigned to Telebit Corp., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hughes-Hartogs's teachings with those of

Telebit 2500. For similar reasons, a person of ordinary skill in the art would be motivated to combine Telebit 2500 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Telebit 2500 with Wu for many reasons. For example, Telebit 2500 describes “error correction and detection protocol.” Telebit 2500 at 191. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Telebit 2500 to implement the details of “measur[ing] the signal-to-noise ratio” taught by Wu because, it is also directed at “high-speed modem telecommunications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “data communications in which a remote and central office modem may initialize communications in order to maximize the available data communication rates and accuracy.” Wu at 3:4-8. In addition, a person of ordinary skill in the art would be motivated to combine Telebit 2500 with Wu because (a) Telebit 2500 and Wu disclose similar products, such as DSL systems (b) Wu is assigned to Texas Instruments, Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wu’s teachings with those of Telebit 2500. For similar reasons, a person of ordinary skill in the art would be motivated to combine Telebit 2500 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Telebit 2500 with T1.413-1998 for many reasons. For example, Telebit 2500 describes “error correction and detection protocol.” Telebit 2500 at 191. A person having ordinary skill in the art would have been

motivated to modify the method and/or device of Telebit 2500 to implement the details of the “line code and the spectral composition of the signals transmitted by both ATU-C and ATU-R” taught by T1.413-1998 because, it is also directed at “digital subscriber line.” T1.413-1998 at 1. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “ensur[ing] the proper interfacing and interworking of ADSL transmission units”. T1.431-1998 at vi. In addition, a person of ordinary skill in the art would be motivated to combine Telebit 2500 with T1.431-1998 because (a) Telebit 2500 and T1.431-1998 disclose similar products, such as DSL systems (b) T1.431-1998 was published by American National Standards Institute, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating T1.413-1998’s teachings with those of Telebit 2500. For similar reasons, a person of ordinary skill in the art would be motivated to combine Telebit 2500 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Telebit 2500 with Golden ATU for many reasons. For example, Telebit 2500 describes “error correction and detection protocol.” Telebit 2500 at 191. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Telebit 2500 to implement the details of the “monitor[ing] line quality and modem performance” taught by Golden ATU because, it is also directed at “digital subscriber line.” Golden ATU at 9. A person of ordinary skill in the art would be motivated by the advantages of such functionality, “monitor[ing] line quality and modem performance”. Golden ATU at 9. In addition, a person of ordinary skill in the art would be

motivated to combine Telebit 2500 with Golden ATU because (a) Telebit 2500 and Golden ATU disclose similar products, such as DSL systems (b) Golden ATU was designed by Alcatel, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Golden ATU's teachings with those of Telebit 2500. For similar reasons, a person of ordinary skill in the art would be motivated to combine Telebit 2500 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Telebit 2500 with Wiese for many reasons. For example, Telebit 2500 describes “error correction and detection protocol.” Telebit 2500 at 191. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Telebit 2500 to implement the details of “initializing a connection between a remote modem and a central unit in a communication system that utilizes a multi-carrier modulation scheme” taught by Weise because, it is also directed at “high-speed bi-directional communication systems.” Wiese at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “in the event that an error is detected, the unit that detects the error transmits designated error symbols which constitute a second predetermined pattern.” Wiese at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Telebit 2500 with Wiese because (a) Telebit 2500 and Wiese disclose similar products, such as DSL systems (b) Wiese is assigned to Texas Instruments, Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor

as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wiese's teachings with those of Telebit 2500. For similar reasons, a person of ordinary skill in the art would be motivated to combine Telebit 2500 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Telebit 2500 with Speed Touch for many reasons. For example, Telebit 2500 describes "error correction and detection protocol." Telebit 2500 at 191. A person of ordinary skill in the art would be motivated to combine Telebit 2500 with Speed Touch because (a) Telebit 2500 and Speed Touch disclose similar products, such as DSL systems (b) Speed Touch was designed by Alcatel, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Speed Touch's teachings with those of Telebit 2500. For similar reasons, a person of ordinary skill in the art would be motivated combine Telebit 2500 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

(7) Exemplary Wu Solutions

A person of ordinary skill in the art would be motivated to combine Wu with Ryckebusch for many reasons. For example, Wu describes "data communications in which a remote and central office modem may initialize communications in order to maximize the available data communication rates and accuracy." Wu at 3:4-8. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wu to implement the details of "a

method to estimate a transmission channel characteristic,” taught by Ryckebusch because, it is also directed at “digital subscriber line” systems. Ryckebusch at 1:5-10. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the DSL system “multiplexing the collected information that will be used for transmission channel characterisation with user data, a transmission channel can be characterised without interruption of the system.” Ryckebusch at 2:34-41. In addition, a person of ordinary skill in the art would be motivated to combine Wu with Ryckebusch because (a) Ryckebusch and Wu disclose similar products, such as DSL systems; (b) Ryckebusch is assigned to Alcatel Lucent SAS, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ryckebusch’s teachings with those of Wu. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wu with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wu with Greszczuk for many reasons. For example, Wu describes “data communications in which a remote and central office modem may initialize communications in order to maximize the available data communication rates and accuracy.” Wu at 3:4-8. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wu to implement the details of “data to be communicated over the link is divided into groups of bits, one group for each subchannel” taught by Greszczuk because, it is also directed at “multicarrier transmission systems[s] for use in digital subscriber line communications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the DSL system “which is capable of rapid return

to full operation.” Greszczuk at 3:18-20. In addition, a person of ordinary skill in the art would be motivated to combine Wu with Greszczuk because (a) Wu and Greszczuk disclose similar products, such as DSL systems; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Greszczuk’s teachings with those of Wu. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wu with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wu with Rango for many reasons. For example, Wu describes “data communications in which a remote and central office modem may initialize communications in order to maximize the available data communication rates and accuracy.” Wu at 3:4-8. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wu to implement the details of “diagnostic information [] passed over a more stable part of [a] channel” taught by Rango because, it is also directed at “transmission of information over a digital subscriber line (DSL).” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “rapid diagnosis of line problems and reduced human intervention, thereby saving both time and money in installing or operating DSL service.” Rango at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Wu with Rango because (a) Wu and Rango disclose similar products, such as DSL systems (b) Rango was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a

reasonable expectation of success in incorporating Rango's teachings with those of Wu. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wu with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wu with Milbrandt 603 for many reasons. For example, Wu describes “data communications in which a remote and central office modem may initialize communications in order to maximize the available data communication rates and accuracy.” Wu at 3:4-8. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wu to implement the details of “store[ing] noise information and cross-channel-coupling information for the first subscriber line and the second subscriber line” taught by Milbrandt 603 because, it is also directed at “digital subscriber lines.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “a system for determining the transmit power of a communication device operating on a twisted pair subscriber line includes a communication server coupled to a first subscriber line and a second subscriber line.” Milbrandt 603 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Wu with Milbrandt 603 because (a) Wu and Milbrandt 603 disclose similar products, such as DSL systems (b) Milbrandt 603 is assigned to Cisco Technology Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Milbrandt 603's teachings with those of Wu. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wu with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wu with Hughes-Hartogs for many reasons. For example, Wu describes “data communications in which a remote and central office modem may initialize communications in order to maximize the available data communication rates and accuracy.” Wu at 3:4-8. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wu to implement the details of “allocating data and power among the carriers to compensate for equivalent noise and to maximize the data rate” taught by Hughes-Hartogs because, it is also directed at “the field of data communications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “modem utilize[ing] a multicarrier modulation scheme and variably allocates data and power to the various carriers to maximize the overall data transmission rate.” Hughes-Hartogs at 2:43-49. In addition, a person of ordinary skill in the art would be motivated to combine Wu with Hughes-Hartogs because (a) Wu and Hughes-Hartogs disclose similar products, such as DSL systems (b) Hughes-Hartogs is assigned to Telebit Corp., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hughes-Hartogs’s teachings with those of Wu. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wu with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wu with Telebit 2500 for many reasons. For example, Wu describes “data communications in which a remote and central office modem may initialize communications in order to maximize the available data communication rates and accuracy.” Wu at 3:4-8. A person having ordinary skill in the art would

have been motivated to modify the method and/or device of Wu to implement the details of an “error correction and detection protocol” taught by Telebit 2500 because, it is also directed at “high speed data transmission.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a modem with an error correction and detection protocol. Telebit 2500 at 1-1. In addition, a person of ordinary skill in the art would be motivated to combine Wu with Telebit 2500 because (a) Wu and Telebit 2500 disclose similar products, such as DSL systems and modems (b) Telebit 2500 was manufactured by Telebit Corp., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Telebit 2500’s teachings with those of Wu. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wu with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wu with T1.413-1998 for many reasons. For example, Wu describes “data communications in which a remote and central office modem may initialize communications in order to maximize the available data communication rates and accuracy.” Wu at 3:4-8. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wu to implement the details of the “line code and the spectral composition of the signals transmitted by both ATU-C and ATU-R” taught by T1.413-1998 because, it is also directed at “digital subscriber line.” T1.413-1998 at 1. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “ensur[ing] the proper interfacing and interworking of ADSL transmission units”. T1.431-1998 at vi. In addition, a person of ordinary skill in the art would be motivated to combine Wu with

T1.431-1998 because (a) Wu and T1.431-1998 disclose similar products, such as DSL systems (b) T1.431-1998 was published by American National Standards Institute, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating T1.413-1998's teachings with those of Wu. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wu with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wu with Golden ATU for many reasons. For example, Wu describes “data communications in which a remote and central office modem may initialize communications in order to maximize the available data communication rates and accuracy.” Wu at 3:4-8. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wu to implement the details of the “monitor[ing] line quality and modem performance” taught by Golden ATU because, it is also directed at “digital subscriber line.” Golden ATU at 9. A person of ordinary skill in the art would be motivated by the advantages of such functionality, “monitor[ing] line quality and modem performance”. Golden ATU at 9. In addition, a person of ordinary skill in the art would be motivated to combine Wu with Golden ATU because (a) Wu and Golden ATU disclose similar products, such as DSL systems (b) Golden ATU was designed by Alcatel, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Golden ATU's teachings with those of Wu. For similar

reasons, a person of ordinary skill in the art would be motivated to combine Wu with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wu with Wiese for many reasons. For example, Wu describes “data communications in which a remote and central office modem may initialize communications in order to maximize the available data communication rates and accuracy.” Wu at 3:4-8. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wu to implement the details of “initializing a connection between a remote modem and a central unit in a communication system that utilizes a multi-carrier modulation scheme” taught by Weise because, it is also directed at “high-speed bi-directional communication systems.” Wiese at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “in the event that an error is detected, the unit that detects the error transmits designated error symbols which constitute a second predetermined pattern.” Wiese at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Wu with Wiese because (a) Wu and Wiese disclose similar products, such as DSL systems (b) Wiese is assigned to Texas Instruments, Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wiese’s teachings with those of Wu. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wu with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wu with Speed Touch for many reasons. For example, Wu describes “data communications in which a remote and central

office modem may initialize communications in order to maximize the available data communication rates and accuracy.” Wu at 3:4-8. A person of ordinary skill in the art would be motivated to combine Wu with Speed Touch because (a) Wu and Speed Touch disclose similar products, such as DSL systems (b) Speed Touch was designed by Alcatel, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Speed Touch’s teachings with those of Wu. For similar reasons, a person of ordinary skill in the art would be motivated combine Wu with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

(8) Exemplary T1.413-1998 Solution

A person of ordinary skill in the art would be motivated to combine T1.413-1998 with Ryckebusch for many reasons. For example, T1.413-1998 describes “ensur[ing] the proper interfacing and interworking of ADSL transmission units.” T1.431-1998 at vi. A person having ordinary skill in the art would have been motivated to modify the method and/or device of T1.413-1998 to implement the details of “a method to estimate a transmission channel characteristic,” taught by Ryckebusch because, it is also directed at “digital subscriber line” systems. Ryckebusch at 1:5-10. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the DSL system “multiplexing the collected information that will be used for transmission channel characterisation with user data, a transmission channel can be characterised without interruption of the system.” Ryckebusch at 2:34-41. In addition, a person of ordinary skill in the art would be motivated to combine T1.413-1998 with Ryckebusch because (a) Ryckebusch and T1.413-1998 disclose similar products, such as DSL systems; (b) Ryckebusch is

assigned to Alcatel Lucent SAS, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ryckebusch's teachings with those of T1.413-1998. For similar reasons, a person of ordinary skill in the art would be motivated to combine T1.413-1998 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine T1.413-1998 with Greszczuk for many reasons. For example, T1.413-1998 describes “ensur[ing] the proper interfacing and interworking of ADSL transmission units.” T1.431-1998 at vi. A person having ordinary skill in the art would have been motivated to modify the method and/or device of T1.413-1998 to implement the details of “data to be communicated over the link is divided into groups of bits, one group for each subchannel” taught by Greszczuk because, it is also directed at “multicarrier transmission systems[s] for use in digital subscriber line communications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the DSL system “which is capable of rapid return to full operation.” Greszczuk at 3:18-20. In addition, a person of ordinary skill in the art would be motivated to combine T1.413-1998 with Greszczuk because (a) T1.413-1998 and Greszczuk disclose similar products, such as DSL systems; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Greszczuk's teachings with those of T1.413-1998. For similar reasons, a person of ordinary skill in the art would be motivated to combine T1.413-1998 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine T1.413-1998 with Rango for many reasons. For example, T1.413-1998 describes “ensur[ing] the proper interfacing and interworking of ADSL transmission units.” T1.431-1998 at vi. A person having ordinary skill in the art would have been motivated to modify the method and/or device of T1.413-1998 to implement the details of “diagnostic information [] passed over a more stable part of [a] channel” taught by Rango because, it is also directed at “transmission of information over a digital subscriber line (DSL).” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “rapid diagnosis of line problems and reduced human intervention, thereby saving both time and money in installing or operating DSL service.” Rango at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine T1.413-1998 with Rango because (a) T1.413-1998 and Rango disclose similar products, such as DSL systems (b) Rango was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Rango’s teachings with those of T1.413-1998. For similar reasons, a person of ordinary skill in the art would be motivated to combine T1.413-1998 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine T1.413-1998 with Milbrandt 603 for many reasons. For example, T1.413-1998 describes “ensur[ing] the proper interfacing and interworking of ADSL transmission units.” T1.431-1998 at vi. A person having ordinary skill in the art would have been motivated to modify the method and/or device of T1.413-1998 to implement the details of “store[ing] noise information and cross-channel-coupling

information for the first subscriber line and the second subscriber line” taught by Milbrandt 603 because, it is also directed at “digital subscriber lines.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “a system for determining the transmit power of a communication device operating on a twisted pair subscriber line includes a communication server coupled to a first subscriber line and a second subscriber line.” Milbrandt 603 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine T1.413-1998 with Milbrandt 603 because (a) T1.413-1998 and Milbrandt 603 disclose similar products, such as DSL systems (b) Milbrandt 603 is assigned to Cisco Technology Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Milbrandt 603’s teachings with those of T1.413-1998. For similar reasons, a person of ordinary skill in the art would be motivated to combine T1.413-1998 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine T1.413-1998 with Hughes-Hartogs for many reasons. For example, T1.413-1998 describes “ensur[ing] the proper interfacing and interworking of ADSL transmission units.” T1.431-1998 at vi. A person having ordinary skill in the art would have been motivated to modify the method and/or device of T1.413-1998 to implement the details of “allocating data and power among the carriers to compensate for equivalent noise and to maximize the data rate” taught by Hughes-Hartogs because, it is also directed at “the field of data communications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “modem utilize[ing] a multicarrier

modulation scheme and variably allocates data and power to the various carriers to maximize the overall data transmission rate.” Hughes-Hartogs at 2:43-49. In addition, a person of ordinary skill in the art would be motivated to combine T1.413-1998 with Hughes-Hartogs because (a) T1.413-1998 and Hughes-Hartogs disclose similar products, such as DSL systems (b) Hughes-Hartogs is assigned to Telebit Corp., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hughes-Hartogs’s teachings with those of T1.413-1998. For similar reasons, a person of ordinary skill in the art would be motivated to combine T1.413-1998 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine T1.413-1998 with Telebit 2500 for many reasons. For example, T1.413-1998 describes “ensur[ing] the proper interfacing and interworking of ADSL transmission units.” T1.431-1998 at vi. A person having ordinary skill in the art would have been motivated to modify the method and/or device of T1.413-1998 to implement the details of an “error correction and detection protocol” taught by Telebit 2500 because, it is also directed at “high speed data transmission.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a modem with an error correction and detection protocol. Telebit 2500 at 1-1. In addition, a person of ordinary skill in the art would be motivated to combine T1.413-1998 with Telebit 2500 because (a) T1.413-1998 and Telebit 2500 disclose similar products, such as DSL systems and modems (b) Telebit 2500 was manufactured by Telebit Corp., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art

and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Telebit 2500's teachings with those of T1.413-1998. For similar reasons, a person of ordinary skill in the art would be motivated to combine T1.413-1998 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine T1.413-1998 with Wu for many reasons. For example, T1.413-1998 describes “ensur[ing] the proper interfacing and interworking of ADSL transmission units.” T1.431-1998 at vi. A person having ordinary skill in the art would have been motivated to modify the method and/or device of T1.413-1998 to implement the details of “measur[ing] the signal-to-noise ratio” taught by Wu because, it is also directed at “high-speed modem telecommunications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “data communications in which a remote and central office modem may initialize communications in order to maximize the available data communication rates and accuracy.” Wu at 3:4-8. In addition, a person of ordinary skill in the art would be motivated to combine T1.413-1998 with Wu because (a) T1.413-1998 and Wu disclose similar products, such as DSL systems (b) Wu is assigned to Texas Instruments, Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wu's teachings with those of T1.413-1998. For similar reasons, a person of ordinary skill in the art would be motivated to combine T1.413-1998 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine T1.413-1998 with Golden ATU for many reasons. For example, T1.413-1998 describes “ensur[ing] the proper interfacing and interworking of ADSL transmission units.” T1.431-1998 at vi. A person having ordinary skill in the art would have been motivated to modify the method and/or device of T1.413-1998 to implement the details of the “monitor[ing] line quality and modem performance” taught by Golden ATU because, it is also directed at “digital subscriber line.” Golden ATU at 9. A person of ordinary skill in the art would be motivated by the advantages of such functionality, “monitor[ing] line quality and modem performance”. Golden ATU at 9. In addition, a person of ordinary skill in the art would be motivated to combine T1.413-1998 with Golden ATU because (a) T1.413-1998 and Golden ATU disclose similar products, such as DSL systems (b) Golden ATU was designed by Alcatel, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Golden ATU’s teachings with those of T1.413-1998. For similar reasons, a person of ordinary skill in the art would be motivated to combine T1.413-1998 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine T1.413-1998 with Wiese for many reasons. For example, T1.413-1998 describes “ensur[ing] the proper interfacing and interworking of ADSL transmission units.” T1.431-1998 at vi. A person having ordinary skill in the art would have been motivated to modify the method and/or device of T1.413-1998 to implement the details of “initializing a connection between a remote modem and a central unit in a communication system that utilizes a multi-carrier modulation scheme” taught by Weise because,

it is also directed at “high-speed bi-directional communication systems.” Wiese at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “in the event that an error is detected, the unit that detects the error transmits designated error symbols which constitute a second predetermined pattern.” Wiese at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine T1.413-1998 with Wiese because (a) T1.413-1998 and Wiese disclose similar products, such as DSL systems (b) Wiese is assigned to Texas Instruments, Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wiese’s teachings with those of T1.413-1998. For similar reasons, a person of ordinary skill in the art would be motivated to combine T1.413-1998 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine T1.413-1998 with Speed Touch for many reasons. For example, T1.413-1998 describes “ensur[ing] the proper interfacing and interworking of ADSL transmission units.” T1.431-1998 at vi. A person of ordinary skill in the art would be motivated to combine T1.413-1998 with Speed Touch because (a) T1.413-1998 and Speed Touch disclose similar products, such as DSL systems (b) Speed Touch was designed by Alcatel, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Speed Touch’s teachings with those of T1.413-1998. For similar reasons, a person of ordinary skill in the

art would be motivated combine T1.413-1998 with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

(9) Exemplary Golden ATU Solutions

A person of ordinary skill in the art would be motivated to combine Golden ATU with Ryckebusch for many reasons. For example, Golden ATU describes “monitor[ing] line quality and modem performance.” Golden ATU at 9. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Golden ATU to implement the details of “a method to estimate a transmission channel characteristic,” taught by Ryckebusch because, it is also directed at “digital subscriber line” systems. Ryckebusch at 1:5-10. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the DSL system “multiplexing the collected information that will be used for transmission channel characterisation with user data, a transmission channel can be characterised without interruption of the system.” Ryckebusch at 2:34-41. In addition, a person of ordinary skill in the art would be motivated to combine Golden ATU with Ryckebusch because (a) Ryckebusch and Golden ATU disclose similar products, such as DSL systems; (b) Ryckebusch is assigned to Alcatel Lucent SAS, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ryckebusch’s teachings with those of Golden ATU. For similar reasons, a person of ordinary skill in the art would be motivated to combine Golden ATU with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Golden ATU with Greszczuk for many reasons. For example, Golden ATU describes “monitor[ing] line quality and modem performance.” Golden ATU at 9. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Golden ATU to implement the details of “data to be communicated over the link is divided into groups of bits, one group for each subchannel” taught by Greszczuk because, it is also directed at “multicarrier transmission systems[s] for use in digital subscriber line communications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the DSL system “which is capable of rapid return to full operation.” Greszczuk at 3:18-20. In addition, a person of ordinary skill in the art would be motivated to combine Golden ATU with Greszczuk because (a) Golden ATU and Greszczuk disclose similar products, such as DSL systems; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Greszczuk’s teachings with those of Golden ATU. For similar reasons, a person of ordinary skill in the art would be motivated to combine Golden ATU with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Golden ATU with Rango for many reasons. For example, Golden ATU describes “monitor[ing] line quality and modem performance.” Golden ATU at 9. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Golden ATU to implement the details of “diagnostic information [] passed over a more stable part of [a] channel” taught by Rango because, it is also directed at “transmission of information over a digital subscriber line (DSL).” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the

“rapid diagnosis of line problems and reduced human intervention, thereby saving both time and money in installing or operating DSL service.” Rango at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Golden ATU with Rango because (a) Golden ATU and Rango disclose similar products, such as DSL systems (b) Rango was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Rango’s teachings with those of Golden ATU. For similar reasons, a person of ordinary skill in the art would be motivated to combine Golden ATU with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Golden ATU with Milbrandt 603 for many reasons. For example, Golden ATU describes “monitor[ing] line quality and modem performance.” Golden ATU at 9. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Golden ATU to implement the details of “store[ing] noise information and cross-channel-coupling information for the first subscriber line and the second subscriber line” taught by Milbrandt 603 because, it is also directed at “digital subscriber lines.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “a system for determining the transmit power of a communication device operating on a twisted pair subscriber line includes a communication server coupled to a first subscriber line and a second subscriber line.” Milbrandt 603 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Golden ATU with Milbrandt 603 because (a) Golden ATU and Milbrandt 603 disclose similar products, such as DSL systems,

(b) Milbrandt 603 is assigned to Cisco Technology Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Milbrandt 603's teachings with those of Golden ATU. For similar reasons, a person of ordinary skill in the art would be motivated to combine Golden ATU with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Golden ATU with Hughes-Hartogs for many reasons. For example, Golden ATU describes “monitor[ing] line quality and modem performance.” Golden ATU at 9. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Golden ATU to implement the details of “allocating data and power among the carriers to compensate for equivalent noise and to maximize the data rate” taught by Hughes-Hartogs because, it is also directed at “the field of data communications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “modem utilize[ing] a multicarrier modulation scheme and variably allocates data and power to the various carriers to maximize the overall data transmission rate.” Hughes-Hartogs at 2:43-49. In addition, a person of ordinary skill in the art would be motivated to combine Golden ATU with Hughes-Hartogs because (a) Golden ATU and Hughes-Hartogs disclose similar products, such as DSL systems, (b) Hughes-Hartogs is assigned to Telebit Corp., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hughes-Hartogs's teachings with those

of Golden ATU. For similar reasons, a person of ordinary skill in the art would be motivated to combine Golden ATU with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Golden ATU with Telebit 2500 for many reasons. For example, Golden ATU describes “monitor[ing] line quality and modem performance.” Golden ATU at 9. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Golden ATU to implement the details of an “error correction and detection protocol” taught by Telebit 2500 because, it is also directed at “high speed data transmission.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a modem with an error correction and detection protocol. Telebit 2500 at 1-1. In addition, a person of ordinary skill in the art would be motivated to combine Golden ATU with Telebit 2500 because (a) Golden ATU and Telebit 2500 disclose similar products, such as DSL systems and modems, (b) Telebit 2500 was manufactured by Telebit Corp., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Telebit 2500’s teachings with those of Golden ATU. For similar reasons, a person of ordinary skill in the art would be motivated to combine Golden ATU with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Golden ATU with Wu for many reasons. For example, Golden ATU describes “monitor[ing] line quality and modem performance.” Golden ATU at 9. A person having ordinary skill in the art would have been

motivated to modify the method and/or device of Golden ATU to implement the details of “measur[ing] the signal-to-noise ratio” taught by Wu because, it is also directed at “high-speed modem telecommunications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “data communications in which a remote and central office modem may initialize communications in order to maximize the available data communication rates and accuracy.” Wu at 3:4-8. In addition, a person of ordinary skill in the art would be motivated to combine Golden ATU with Wu because (a) Golden ATU and Wu disclose similar products, such as DSL systems, (b) Wu is assigned to Texas Instruments, Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wu’s teachings with those of Golden ATU. For similar reasons, a person of ordinary skill in the art would be motivated to combine Golden ATU with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Golden ATU with T1.413-1998 for many reasons. For example, Golden ATU describes “monitor[ing] line quality and modem performance.” Golden ATU at 9. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Golden ATU to implement the details of the “line code and the spectral composition of the signals transmitted by both ATU-C and ATU-R” taught by T1.413-1998 because, it is also directed at “digital subscriber line.” T1.413-1998 at 1. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “ensur[ing] the proper interfacing and interworking of ADSL transmission units”. T1.431-

1998 at vi. In addition, a person of ordinary skill in the art would be motivated to combine Golden ATU with T1.431-1998 because (a) Golden ATU and T1.431-1998 disclose similar products, such as DSL systems (b) T1.431-1998 was published by American National Standards Institute, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating T1.413-1998's teachings with those of Golden ATU. For similar reasons, a person of ordinary skill in the art would be motivated to combine Golden ATU with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Golden ATU with Wiese for many reasons. For example, Golden ATU describes “monitor[ing] line quality and modem performance.” Golden ATU at 9. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Golden ATU to implement the details of “initializing a connection between a remote modem and a central unit in a communication system that utilizes a multi-carrier modulation scheme” taught by Weise because, it is also directed at “high-speed bi-directional communication systems.” Wiese at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “in the event that an error is detected, the unit that detects the error transmits designated error symbols which constitute a second predetermined pattern.” Wiese at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Golden ATU with Wiese because (a) Golden ATU and Wiese disclose similar products, such as DSL systems, (b) Wiese is assigned to Texas Instruments, Inc., a leader in the industry to which a person of ordinary skill in the art may look

when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wiese's teachings with those of Golden ATU. For similar reasons, a person of ordinary skill in the art would be motivated to combine Golden ATU with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Golden ATU with Speed Touch for many reasons. For example, Golden ATU describes “monitor[ing] line quality and modem performance.” Golden ATU at 9. A person of ordinary skill in the art would be motivated to combine Golden ATU with Speed Touch because (a) Golden ATU and Speed Touch disclose similar products, such as DSL systems, (b) Speed Touch was designed by Alcatel, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Speed Touch's teachings with those of Golden ATU. For similar reasons, a person of ordinary skill in the art would be motivated combine Golden ATU with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

(10) Exemplary Wiese Solutions

A person of ordinary skill in the art would be motivated to combine Wiese with Ryckebusch for many reasons. For example, Wiese describes “in the event that an error is detected, the unit that detects the error transmits designated error symbols which constitute a second predetermined pattern.” Wiese at Abstract. A person having ordinary skill in the art would have

been motivated to modify the method and/or device of Wiese to implement the details of “a method to estimate a transmission channel characteristic,” taught by Rycebusch because, it is also directed at “digital subscriber line” systems. Rycebusch at 1:5-10. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the DSL system “multiplexing the collected information that will be used for transmission channel characterisation with user data, a transmission channel can be characterised without interruption of the system.” Rycebusch at 2:34-41. In addition, a person of ordinary skill in the art would be motivated to combine Wiese with Rycebusch because (a) Rycebusch and Wiese disclose similar products, such as DSL systems; (b) Rycebusch is assigned to Alcatel Lucent SAS, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Rycebusch’s teachings with those of Wiese. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wiese with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wiese with Greszczuk for many reasons. For example, Wiese describes “in the event that an error is detected, the unit that detects the error transmits designated error symbols which constitute a second predetermined pattern.” Wiese at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wiese to implement the details of “data to be communicated over the link is divided into groups of bits, one group for each subchannel” taught by Greszczuk because, it is also directed at “multicarrier transmission systems[s] for use in digital subscriber line communications.” A person of ordinary skill in the art would be motivated by the advantages of

such functionality, such as the DSL system “which is capable of rapid return to full operation.” Greszczuk at 3:18-20. In addition, a person of ordinary skill in the art would be motivated to combine Wiese with Greszczuk because (a) Wiese and Greszczuk disclose similar products, such as DSL systems; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Greszczuk’s teachings with those of Wiese. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wiese with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wiese with Rango for many reasons. For example, Wiese describes “in the event that an error is detected, the unit that detects the error transmits designated error symbols which constitute a second predetermined pattern.” Wiese at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wiese to implement the details of “diagnostic information [] passed over a more stable part of [a] channel” taught by Rango because, it is also directed at “transmission of information over a digital subscriber line (DSL).” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “rapid diagnosis of line problems and reduced human intervention, thereby saving both time and money in installing or operating DSL service.” Rango at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Wiese with Rango because (a) Wiese and Rango disclose similar products, such as DSL systems, (b) Rango was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a

reasonable expectation of success in incorporating Rango's teachings with those of Wiese. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wiese with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wiese with Milbrandt 603 for many reasons. For example, Wiese describes “in the event that an error is detected, the unit that detects the error transmits designated error symbols which constitute a second predetermined pattern.” Wiese at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wiese to implement the details of “store[ing] noise information and cross-channel-coupling information for the first subscriber line and the second subscriber line” taught by Milbrandt 603 because, it is also directed at “digital subscriber lines.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “a system for determining the transmit power of a communication device operating on a twisted pair subscriber line includes a communication server coupled to a first subscriber line and a second subscriber line.” Milbrandt 603 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Wiese with Milbrandt 603 because (a) Wiese and Milbrandt 603 disclose similar products, such as DSL systems, (b) Milbrandt 603 is assigned to Cisco Technology Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Milbrandt 603's teachings with those of Wiese. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wiese with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wiese with Hughes-Hartogs for many reasons. For example, Wiese describes “in the event that an error is detected, the unit that detects the error transmits designated error symbols which constitute a second predetermined pattern.” Wiese at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wiese to implement the details of “allocating data and power among the carriers to compensate for equivalent noise and to maximize the data rate” taught by Hughes-Hartogs because, it is also directed at “the field of data communications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “modem utilize[ing] a multicarrier modulation scheme and variably allocates data and power to the various carriers to maximize the overall data transmission rate.” Hughes-Hartogs at 2:43-49. In addition, a person of ordinary skill in the art would be motivated to combine Wiese with Hughes-Hartogs because (a) Wiese and Hughes-Hartogs disclose similar products, such as DSL systems, (b) Hughes-Hartogs is assigned to Telebit Corp., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hughes-Hartogs’s teachings with those of Wiese. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wiese with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wiese with Telebit 2500 for many reasons. For example, Wiese describes “in the event that an error is detected, the unit that detects the error transmits designated error symbols which constitute a second

predetermined pattern.” Wiese at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wiese to implement the details of an “error correction and detection protocol” taught by Telebit 2500 because, it is also directed at “high speed data transmission.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a modem with an error correction and detection protocol. Telebit 2500 at 1-1. In addition, a person of ordinary skill in the art would be motivated to combine Wiese with Telebit 2500 because (a) Wiese and Telebit 2500 disclose similar products, such as DSL systems and modems, (b) Telebit 2500 was manufactured by Telebit Corp., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Telebit 2500’s teachings with those of Wiese. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wiese with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wiese with Wu for many reasons. For example, Wiese describes “in the event that an error is detected, the unit that detects the error transmits designated error symbols which constitute a second predetermined pattern.” Wiese at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wiese to implement the details of “measur[ing] the signal-to-noise ratio” taught by Wu because, it is also directed at “high-speed modem telecommunications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “data communications in which a remote and central office modem may initialize communications in order to maximize the available data communication rates and

accuracy.” Wu at 3:4-8. In addition, a person of ordinary skill in the art would be motivated to combine Wiese with Wu because (a) Wiese and Wu disclose similar products, such as DSL systems (b) Wu is assigned to Texas Instruments, Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wu’s teachings with those of Wiese. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wiese with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wiese with T1.413-1998 for many reasons. For example, Wiese describes “in the event that an error is detected, the unit that detects the error transmits designated error symbols which constitute a second predetermined pattern.” Wiese at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wiese to implement the details of the “line code and the spectral composition of the signals transmitted by both ATU-C and ATU-R” taught by T1.413-1998 because, it is also directed at “digital subscriber line.” T1.413-1998 at 1. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “ensur[ing] the proper interfacing and interworking of ADSL transmission units”. T1.431-1998 at vi. In addition, a person of ordinary skill in the art would be motivated to combine Wiese with T1.431-1998 because (a) Wiese and T1.431-1998 disclose similar products, such as DSL systems (b) T1.431-1998 was published by American National Standards Institute, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for

example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating T1.413-1998's teachings with those of Wiese. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wiese with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wiese with Golden ATU for many reasons. For example, Wiese describes “in the event that an error is detected, the unit that detects the error transmits designated error symbols which constitute a second predetermined pattern.” Wiese at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wiese to implement the details of the “monitor[ing] line quality and modem performance” taught by Golden ATU because, it is also directed at “digital subscriber line.” Golden ATU at 9. A person of ordinary skill in the art would be motivated by the advantages of such functionality, “monitor[ing] line quality and modem performance”. Golden ATU at 9. In addition, a person of ordinary skill in the art would be motivated to combine Wiese with Golden ATU because (a) Wiese and Golden ATU disclose similar products, such as DSL systems, (b) Golden ATU was designed by Alcatel, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Golden ATU's teachings with those of Wiese. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wiese with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wiese with Speed Touch for many reasons. For example, Wiese describes “in the event that an error is detected, the unit that detects the error transmits designated error symbols which constitute a second predetermined pattern.” Wiese at Abstract. A person of ordinary skill in the art would be motivated to combine Wiese with Speed Touch because (a) Wiese and Speed Touch disclose similar products, such as DSL systems, (b) Speed Touch was designed by Alcatel, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Speed Touch’s teachings with those of Wiese. For similar reasons, a person of ordinary skill in the art would be motivated combine Wiese with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

(11) Exemplary Speed Touch Solutions

A person of ordinary skill in the art would be motivated to combine Speed Touch with Ryckebusch for many reasons. For example, Speed Touch is a DSL modem. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Speed Touch to implement the details of “a method to estimate a transmission channel characteristic,” taught by Ryckebusch because, it is also directed at “digital subscriber line” systems. Ryckebusch at 1:5-10. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the DSL system “multiplexing the collected information that will be used for transmission channel characterisation with user data, a transmission channel can be characterised without interruption of the system.” Ryckebusch at 2:34-41. In addition, a person of ordinary skill in the art would be motivated to combine Speed Touch with Ryckebusch because

(a) Ryckebusch and Speed Touch disclose similar products, such as DSL systems, (b) Ryckebusch is assigned to Alcatel Lucent SAS, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ryckebusch's teachings with those of Speed Touch. For similar reasons, a person of ordinary skill in the art would be motivated to combine Speed Touch with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Speed Touch with Greszczuk for many reasons. For example, Speed Touch is a DSL modem. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Speed Touch to implement the details of “data to be communicated over the link is divided into groups of bits, one group for each subchannel” taught by Greszczuk because, it is also directed at “multicarrier transmission systems[s] for use in digital subscriber line communications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the DSL system “which is capable of rapid return to full operation.” Greszczuk at 3:18-20. In addition, a person of ordinary skill in the art would be motivated to combine Speed Touch with Greszczuk because (a) Speed Touch and Greszczuk disclose similar products, such as DSL systems; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Greszczuk's teachings with those of Speed Touch. For similar reasons, a person of ordinary skill in the art would be motivated to combine Speed Touch

with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Speed Touch with Rango for many reasons. For example, Speed Touch is a DSL modem. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Speed Touch to implement the details of “diagnostic information [] passed over a more stable part of [a] channel” taught by Rango because, it is also directed at “transmission of information over a digital subscriber line (DSL).” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “rapid diagnosis of line problems and reduced human intervention, thereby saving both time and money in installing or operating DSL service.” Rango at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Speed Touch with Rango because (a) Speed Touch and Rango disclose similar products, such as DSL systems (b) Rango was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Rango’s teachings with those of Speed Touch. For similar reasons, a person of ordinary skill in the art would be motivated to combine Speed Touch with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Speed Touch with Milbrandt 603 for many reasons. For example, Speed Touch is a DSL modem. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Speed Touch to implement the details of “store[ing] noise information and cross-channel-coupling

information for the first subscriber line and the second subscriber line” taught by Milbrandt 603 because, it is also directed at “digital subscriber lines.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “a system for determining the transmit power of a communication device operating on a twisted pair subscriber line includes a communication server coupled to a first subscriber line and a second subscriber line.” Milbrandt 603 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Speed Touch with Milbrandt 603 because (a) Speed Touch and Milbrandt 603 disclose similar products, such as DSL systems (b) Milbrandt 603 is assigned to Cisco Technology Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Milbrandt 603’s teachings with those of Speed Touch. For similar reasons, a person of ordinary skill in the art would be motivated to combine Speed Touch with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Speed Touch with Hughes-Hartogs for many reasons. For example, Speed Touch is a DSL modem. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Speed Touch to implement the details of “allocating data and power among the carriers to compensate for equivalent noise and to maximize the data rate” taught by Hughes-Hartogs because, it is also directed at “the field of data communications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “modem utilize[ing] a multicarrier modulation scheme and variably allocates data and power to the various carriers to maximize the

overall data transmission rate.” Hughes-Hartogs at 2:43-49. In addition, a person of ordinary skill in the art would be motivated to combine Speed Touch with Hughes-Hartogs because (a) Speed Touch and Hughes-Hartogs disclose similar products, such as DSL systems, (b) Hughes-Hartogs is assigned to Telebit Corp., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hughes-Hartogs’s teachings with those of Speed Touch. For similar reasons, a person of ordinary skill in the art would be motivated to combine Speed Touch with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Speed Touch with Telebit 2500 for many reasons. For example, Speed Touch is a DSL modem. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Speed Touch to implement the details of an “error correction and detection protocol” taught by Telebit 2500 because, it is also directed at “high speed data transmission.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a modem with an error correction and detection protocol. Telebit 2500 at 1-1. In addition, a person of ordinary skill in the art would be motivated to combine Speed Touch with Telebit 2500 because (a) Speed Touch and Telebit 2500 disclose similar products, such as DSL systems and modems (b) Telebit 2500 was manufactured by Telebit Corp., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Telebit

2500's teachings with those of Speed Touch. For similar reasons, a person of ordinary skill in the art would be motivated to combine Speed Touch with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Speed Touch with Wu for many reasons. For example, Speed Touch is a DSL modem. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Speed Touch to implement the details of “measur[ing] the signal-to-noise ratio” taught by Wu because, it is also directed at “high-speed modem telecommunications.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “data communications in which a remote and central office modem may initialize communications in order to maximize the available data communication rates and accuracy.” Wu at 3:4-8. In addition, a person of ordinary skill in the art would be motivated to combine Speed Touch with Wu because (a) Speed Touch and Wu disclose similar products, such as DSL systems, (b) Wu is assigned to Texas Instruments, Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wu's teachings with those of Speed Touch. For similar reasons, a person of ordinary skill in the art would be motivated to combine Speed Touch with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Speed Touch with T1.413-1998 for many reasons. For example, Speed Touch is a DSL modem. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Speed

Touch to implement the details of the “line code and the spectral composition of the signals transmitted by both ATU-C and ATU-R” taught by T1.413-1998 because, it is also directed at “digital subscriber line.” T1.413-1998 at 1. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “ensur[ing] the proper interfacing and interworking of ADSL transmission units”. T1.431-1998 at vi. In addition, a person of ordinary skill in the art would be motivated to combine Speed Touch with T1.431-1998 because (a) Speed Touch and T1.431-1998 disclose similar products, such as DSL systems, (b) T1.431-1998 was published by American National Standards Institute, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating T1.413-1998’s teachings with those of Speed Touch. For similar reasons, a person of ordinary skill in the art would be motivated to combine Speed Touch with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Speed Touch with Golden ATU for many reasons. For example, Speed Touch is a DSL modem. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Speed Touch to implement the details of the “monitor[ing] line quality and modem performance” taught by Golden ATU because, it is also directed at “digital subscriber line.” Golden ATU at 9. A person of ordinary skill in the art would be motivated by the advantages of such functionality, “monitor[ing] line quality and modem performance”. Golden ATU at 9. In addition, a person of ordinary skill in the art would be motivated to combine Speed Touch with Golden ATU because (a) Speed Touch and Golden ATU disclose similar products, such as DSL systems, (b) Golden

ATU was designed by Alcatel, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Golden ATU's teachings with those of Speed Touch. For similar reasons, a person of ordinary skill in the art would be motivated to combine Speed Touch with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Speed Touch with Wiese for many reasons. For example, Speed Touch is a DSL modem. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Speed Touch to implement the details of “initializing a connection between a remote modem and a central unit in a communication system that utilizes a multi-carrier modulation scheme” taught by Weise because, it is also directed at “high-speed bi-directional communication systems.” Wiese at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “in the event that an error is detected, the unit that detects the error transmits designated error symbols which constitute a second predetermined pattern.” Wiese at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Speed Touch with Wiese because (a) Speed Touch and Wiese disclose similar products, such as DSL systems, (b) Wiese is assigned to Texas Instruments, Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wiese's teachings with those of Speed Touch. For similar reasons, a person of ordinary skill in the art would be

motivated to combine Speed Touch with other references in Exhibits F1-686A – F1-686K and F1-Secondary-686 with similar teachings.

(12) Exemplary Obviousness Reference Solutions

A person of ordinary skill in the art would be motivated to combine Ryckebusch, Greszczuk, Rango, Milbrandt 603, Hughes-Hartogs, Telebit 250, Wu, T1.413-1998, Golden ATU, Wiese, and Speed Touch (the “Primary References”) with the Secondary References for many reasons. As described above, each of the primary references teach a digital subscriber line system, device, and/or method. *See* Sections II.B.3.c(1)-(11). A person having ordinary skill in the art would have been motivated to modify the method of the Primary References to implement the details of the Secondary References because they are also directed at improved digital subscriber line systems, devices, and/or methods. For example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of discrete multi-tone technology. Hwang at 2:66-3:14. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of “loop integrity test devices”. Sisk at Abstract. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of data “transmitted between [] transceivers by modulating the data onto a multiplicity of carrier waves in the form of multi-bit symbols, wherein each carrier wave constitutes a channel, and wherein the number of bits per symbol (the bit loading), varies between channels and, within a channel, with time, so that each channel has associated therewith a bit loading parameter.” Isaksson at Abstract. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of a “digital high speed data modem which reduces its transmitted data rate in small increments in response to telephone line impairments.” Baran at 4:19-22. As

another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of “a signal modulation method comprising receiving at least first and second synchronized incoming streams of complex symbols, thereby to define a plurality of incoming vectors each including at least first and second synchronized complex symbols, mapping each complex symbol into a signal component comprising a linear combination of an in-phase signal and a quadrature signal, the quadrature signal comprising a Hilbert transform of said in-phase signal, wherein all of the signal components are substantially mutually orthogonal and wherein the frequency spectrums of all signal components mapped from a single incoming stream are centered around a common frequency location which is unique to the single incoming stream and wherein the frequency spectrums of signal components mapped from different incoming streams having adjacent common frequency locations are partially overlapping and wherein signal components mapped from sequential incoming symbols partially overlap in time and combining all of the signal components into a representation of an output signal.” Frenkel at Abstract. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of “test circuitry [that] generates test data corresponding to the received signals.” Chang at Abstract. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of messages that include SNR_R. Jacobsen at 10. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of asymmetric digital subscriber line standard. T1.413-1995 at 1.1. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of “proper interfacing and interworking of ADSL transmission units at the customer end (ATU-R) and at the network operator end (ATU-C).” G.992.1 at 1. As another example, a person of ordinary skill in

the art would be motivated by the advantages of such functionality, such as the use of PEP. Held at 418. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of the standard for DMT line code. TR-024 at 1. In addition, a person of ordinary skill in the art would be motivated to combine any Primary Reference with and Secondary reference because (a) each reference discloses similar products, such as DSL systems and (b) the references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the Secondary References' teachings with those of the Primary References. For similar reasons, a person of ordinary skill in the art would be motivated to combine the Primary References with other references in Exhibits F1-686A – F1-686K and F1 Secondary-686 with similar teachings.

d) The Claims Recite Well-Known Concepts That Would Have Been Obvious to Implement.

The Asserted Claims represent nothing more than an arrangement of well-known concepts and features, and add nothing to the state of the art at the time of the alleged invention. For each of the concepts represented by the Asserted Claims, it would have been obvious to add to the teachings of any number of known products and references, including to the teachings of any of the primary references in Exhibits F1-686A – F1-686K and F1 Secondary-686 to the extent that such reference is alleged to be missing such concept or feature. The following are examples of concepts that would have been obvious, which is not intended to be an exhaustive list of the claimed features that would have been obvious. Nokia Defendants reserve the right to supplement these examples as necessary.

- (1) It would have been obvious to modify any primary reference for “instructions that when executed transmit a diagnostic message from the transceiver using multicarrier

modulation, wherein the diagnostic message comprises a plurality of data variables representing the diagnostic information about the communication channel and each bit in the diagnostic message is mapped to at least one DMT symbol, and wherein one variable comprises an array representing frequency domain received idle channel noise information” (Claim 17)

To the extent TQ Delta contends that any reference charted in Exhibits F1-686A – F1-686K and F1 Secondary-686 does not disclose “instructions that when executed transmit a diagnostic message from the transceiver using multicarrier modulation, wherein the diagnostic message comprises a plurality of data variables representing the diagnostic information about the communication channel and each bit in the diagnostic message is mapped to at least one DMT symbol, and wherein one variable comprises an array representing frequency domain received idle channel noise information” it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F1-686A – F1-686K and F1 Secondary-686. A person having ordinary skill in the art would have been motivated to employ or implement that feature. *See* Hwang at 2:66-3:14. A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See* Sisk at 3:6-29. A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See* Isaksson at 22:9-17. Employing methods or device that module bits of a message onto DMT symbols would have accomplished efficient data transmission in a digital subscriber line system. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(2) It would have been obvious to modify any primary reference for “instructions that when executed transmit from the transceiver a diagnostic message using multicarrier modulation with DMT symbols that are mapped to one bit of the diagnostic message, wherein the diagnostic message comprises a plurality of

data variables representing the diagnostic information about the communication channel, and wherein one variable comprises an array representing is frequency domain received idle channel noise information” (Claim 36)

To the extent TQ Delta contends that any reference charted in Exhibits F1-686A – F1-686K and F1 Secondary-686 does not disclose “instructions that when executed transmit from the transceiver a diagnostic message using multicarrier modulation with DMT symbols that are mapped to one bit of the diagnostic message, wherein the diagnostic message comprises a plurality of data variables representing the diagnostic information about the communication channel, and wherein one variable comprises an array representing is frequency domain received idle channel noise information” it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F1-686A – F1-686K and F1 Secondary-686. A person having ordinary skill in the art would have been motivated to employ or implement that feature. *See* Hwang at 2:66-3:14. A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See* Sisk at 3:6-29. A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See* Isaksson at 22:9-17. Employing methods or device that module bits of a message onto DMT symbols would have accomplished efficient data transmission in a digital subscriber line system. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(3) It would have been obvious to modify any primary reference for “transmitting, during a diagnostic mode, a diagnostic message using multicarrier modulation, wherein the diagnostic message comprises a plurality of data variables representing the diagnostic information about the communication channel and at least one bit in the diagnostic message is mapped to at least one DMT symbol, wherein one variable comprises an array

representing frequency domain received idle channel noise information” (Claim 40)

To the extent TQ Delta contends that any reference charted in Exhibits F1-686A – F1-686K and F1 Secondary-686 does not disclose “transmitting, during a diagnostic mode, a diagnostic message using multicarrier modulation, wherein the diagnostic message comprises a plurality of data variables representing the diagnostic information about the communication channel and at least one bit in the diagnostic message is mapped to at least one DMT symbol, wherein one variable comprises an array representing frequency domain received idle channel noise information” it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F1-686A – F1-686K and F1 Secondary-686. A person having ordinary skill in the art would have been motivated to employ or implement that feature. *See Hwang* at 2:66-3:14. A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See Sisk* at 3:6-29. A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See Isaksson* at 22:9-17. Employing methods or device that module bits of a message onto DMT symbols would have accomplished efficient data transmission in a digital subscriber line system. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

e) Additional Reasons to Combine.

In addition to the information contained elsewhere in these invalidity contentions, including in Exhibits F1-686A – F1-686K and F1 Secondary-686, Nokia Defendants have identified additional motivations and reasons to combine the various references. Nokia Defendants note that in *KSR Int’l Co. v. Teleflex Inc.*, the Supreme Court held that “[i]n determining whether

the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. What matters is the objective reach of the claim. If the claim extends to what is obvious, it is invalid under § 103.” 127 S. Ct. 1727, 1742 (2007).

KSR further illustrated several ways in which the subject matter of a patent claim may be shown to have been obvious. For instance, “[o]ne of the ways in which a patent’s subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent’s claims.” *KSR*, 127 S. Ct. at 1742. The Supreme Court held that it was error to “look only to the problem the patentee was trying to solve.” *Id.* As the Court explained, “[t]he question is not whether the combination was obvious to the patentee but whether the combination was obvious to a person with ordinary skill in the art. Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *Id.* Further, “[c]ommon sense teaches ... that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle.” *Id.* Further, a showing that a combination of elements was “obvious to try” may demonstrate that it was obvious under § 103. *Id.* For instance, the Supreme Court held that “predictable solutions” using a combination of “known options” may render the subject matter of a patent claim obvious. *Id.*

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product was not of innovation but of ordinary skill and common sense. *Id.* The ways in which the subject matter of a patent claim may be shown to be obvious, identified by *KSR*, are

merely illustrative. A core thrust of *KSR* was that “[r]igid preventative rules that deny factfinders recourse to common sense are neither necessary under our case law nor consistent with it.” *KSR*, 127 S. Ct. at 1742-43 (quoting *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1367 (Fed. Cir. 2006) (“Our suggestion test is in actuality quite flexible and not only permits, but requires, consideration of common knowledge and common sense”), and *Alza Corp. v. Mylan Labs., Inc.*, 464 F.3d 1286, 1291 (Fed. Cir. 2006) (“There is flexibility in our obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires an actual teaching to combine ...”).

Although Nokia Defendants note that there is no longer a rigid requirement regarding motivation to combine under *KSR*, Nokia Defendants provide the following statements regarding motivation to combine. Multiple teachings, suggestions, and/or reasons to modify any of the references and/or to combine any two or more of the references in Exhibits F1-686A – F1-686K and F1 Secondary-686 come from many sources, including the prior art (specific and as a whole), common knowledge, common sense, predictability, expectations, industry trends, design incentives or need, market demands or pressure, market forces, obvious to try, the nature of the problem faced, and/or knowledge possessed by one of ordinary skill. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one.

The combination of prior art references identified in these contentions would have been obvious because the combination represents the known potential options with a reasonable expectation of success. Additionally, one of ordinary skill in the art would have been motivated to

create combinations identified in these contentions using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or teaching, suggestion, or motivation in the prior art generally. Also, market forces in the industry, and the desire to improve features and performance, would motivate the addition of features to systems as they became available, became less expensive, became more commonly used, provided better performance, reduced costs, size or weight, or predictably achieved other desirable results.

C. Other Grounds for Invalidity

Nokia Defendants identify the following additional grounds for invalidity of the Asserted Claims of the Family 1 Patent. Nokia Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

1. Invalidity of the Family 1 Patent Based on 35 U.S.C. § 112, ¶ 1 (Enablement and Written Description)

Based on Nokia Defendants' present understanding of TQ Delta's asserted scope of the claims of the Family 1 Patent, to the extent such positions can be understood from TQ Delta's Preliminary Infringement Contentions, the Asserted Claims of the Family 1 Patent are invalid for reciting at least the following claim terms, phrases, or limitations that lack enablement or sufficient written description:

- “each bit in the diagnostic message is mapped to at least one DMT symbol” ('686 Patent, claim 17)
- “using multicarrier modulation with DMT symbols that are mapped to one bit of the diagnostic message” ('686 Patent, claim 36)
- “at least one bit in the diagnostic message is mapped to at least one DMT symbol” (Claim 40)
- “wherein one variable comprises an array representing is frequency domain received idle channel noise information” ('686 Patent, claims 17, 36, 40)

These claim terms, phrases, and limitations, as apparently construed by TQ Delta, fail to satisfy the enablement and/or written description requirements of 35 U.S.C. § 112. This is at least because the specifications of the Family 1 Patent demonstrate that the patentee neither conceived of nor demonstrated possession of all that TQ Delta now contends the claims cover. In addition, based on Defendant's present understanding of TQ Delta's Preliminary Infringement Contentions, each of the Asserted Claims of the Family 1 Patent in which these claim terms, phrases, and limitations appear is invalid because the specification fails to provide sufficient disclosure to enable a person of ordinary skill in the art to which the alleged invention pertains, or with which it is most nearly connected, to implement the alleged invention without undue experimentation.

2. Invalidity of the Family 1 Patent Based on 35 U.S.C. § 112, ¶ 2 (Indefiniteness)

Based on the Nokia Defendants' present understanding of TQ Delta's asserted scope of the claims of the Family 1 Patent, to the extent such positions can be understood from TQ Delta's Preliminary Infringement Contentions, the Nokia Defendants assert that the Asserted Claims of the Family 1 Patent are invalid for reciting at least the following indefinite claim terms, phrases, or limitations:

- “instructions that when executed transmit a diagnostic message from the transceiver using multicarrier modulation, wherein the diagnostic message comprises a plurality of data variables representing the diagnostic information about the communication channel and each bit in the diagnostic message is mapped to at least one DMT symbol, and wherein one variable comprises an array representing frequency domain received idle channel noise information” (’686 patent, claim 17)
- “instructions that when executed transmit from the transceiver a diagnostic message using multicarrier modulation with DMT symbols that are mapped to one bit of the diagnostic message, wherein the diagnostic message comprises a plurality of data variables representing the diagnostic information about the communication channel, and wherein one variable comprises an array representing is frequency domain received idle channel noise information” (’686 patent, claim 36)

- “transmitting, during a diagnostic mode, a diagnostic message using multicarrier modulation, wherein the diagnostic message comprises a plurality of data variables representing the diagnostic information about the communication channel and at least one bit in the diagnostic message is mapped to at least one DMT symbol, wherein one variable comprises an array representing frequency domain received idle channel noise information” (’686 patent, claim 40)

These claim terms, phrases, and limitations, as apparently construed by TQ Delta, violate the definiteness requirements of 35 U.S.C. § 112.

Based on Nokia Defendants’ present understanding of TQ Delta’s Preliminary Infringement Contentions, these claim terms, phrases, and limitations are indefinite because they are inconsistent with and broader than the alleged invention disclosed in the specification and during prosecution. And given TQ Delta’s apparent constructions of the claim terms, phrases, and limitations, persons of ordinary skill in the art at the time of the invention would not have understood what is claimed with reasonable certainty, even when the claims are read in light of the specification and prosecution history.

3. Additional Grounds for Invalidity of the Family 1 Patent

In addition to the preceding invalidity contentions, Nokia Defendants reserve the right to assert that the Asserted Claims are invalid under 35 U.S.C. § 102(f) and/or § 102(g) in the event that Nokia Defendants obtain evidence that the named inventor of the Family 1 Patent did not invent (either alone or in conjunction with other parties) the subject matter claimed in the Family 1 Patent. Should Nokia Defendants obtain such evidence, Nokia Defendants will provide the name of the person(s) from whom and the circumstances under which the invention or any part of it was derived, and/or the circumstances surrounding the making of the invention before the patent application.

4. Double Patenting

All asserted claims of the Family 1 Patent are invalid due to nonstatutory obviousness-type double patenting based on at least claims in U.S. Patent No. 8,238,412 to Krinsky (“Krinsky I”) and U.S. Patent No. 6,658,052 to Krinsky (“Krinsky II”) alone or in view of the prior art based on Nokia’s understanding of how TQ Delta is construing the claims, as described in Exhibit F1-686DP. Additionally, the Family 1 Patents are invalid due to nonstatutory obviousness-type double patenting based on U.S. Patent Nos. 6,665,805, 7,889,784, 8,432,956 alone or in view of the prior art based on Nokia’s understanding of how TQ Delta is construing the claims.

5. Collateral Estoppel

TQ Delta is estopped from asserting the claims of the Family 1 Patent in view of decisions rendered by the District of Delaware and the Patent Trial and Appeal Board. *See, e.g., TQ Delta, LLC v. ADTRAN, Inc.*, Case No. 1:14-cv-00954-RGA (D. Del); IPR2016-01006. Here, identical invalidity issues were previously adjudicated by the District of Delaware and by the PTAB. Therefore, TQ Delta is precluded from arguing that the claims of the Family 1 Patent are valid/not invalid.

Nokia Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

III. THE ASSERTED FAMILY 2 PATENTS ARE INVALID.

A. Identification of Prior Art

Nokia Defendants contend that the prior art references described and charted in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 anticipate and/or render obvious, alone or in combination, one or more of the Asserted Claims of the Family 2 Patents.

B. The Asserted Claims Are Anticipated and/or Rendered Obvious.

TQ Delta asserts claims 1, 9, 10, 11, 12, and 13 of 9,014,193, claims 8, 9, 13, 14, 15, 16, 17, 18, and 21 of 9,300,601, and claims 1 and 3 of 9,894,014 (collectively, the “Family 2 Patents”) against the Nokia Defendants in this lawsuit. These claims are invalid because the Family 2 Patents fail to meet one or more of the requirements for patentability. The individual bases for invalidity are provided below and in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014. Each of the prior art references, the underlying work, and/or the underlying apparatus or method qualifies as prior art under one or more sections of 35 U.S.C. §§ 102 and/or 103.

In an effort to focus the issues, the Nokia Defendants have cited representative portions of identified references, even where a reference may contain additional disclosures or support for a particular claim element. Each and every disclosure of the same limitation in the same reference is not necessarily identified. In addition, persons of ordinary skill in the art generally read a prior art reference as a whole and in the context of other publications and literature and in the context of their knowledge as persons of ordinary skill in the art. Thus, to understand and interpret any specific statement or disclosure within a prior art reference, such persons would rely on other information within the reference, along with other publications and their general scientific knowledge and experience in the field. Thus, each prior art reference identified herein should be understood in the context of the reference itself, in conjunction with anything incorporated by reference or described as relevant technology by the reference, any documents that are referred to for further understanding by the reference, any system embodying the reference, and any testimony by those with knowledge of the reference, such as the named authors and inventors. The Nokia Defendants may rely on uncited portions of the prior art references and on other publications and

expert testimony to provide context, and as aids to understanding and interpreting the portions that are cited. Nokia Defendants may also rely on uncited portions of the prior art references, other disclosed publications, and the testimony of experts to establish that a person of ordinary skill in the art would have been motivated to modify or combine certain of the cited references so as to render the claims obvious.

1. The Family 2 Patents Priority Date.

TQ Delta's Preliminary Infringement Contentions allege that the Asserted Claims of the Family 2 Patents are entitled at least to the priority date October 5, 2001, October 4, 2002, or October 8, 2008. To the extent TQ Delta alleges that any prior art relied on in these invalidity contentions does not qualify as prior art to an Asserted Patent, Nokia Defendants reserve the right to rebut those allegations (*e.g.*, by demonstrating an earlier relevant date for the challenged prior art and/or a later priority date for the Asserted Patent and/or Asserted Claim).

2. The Family 2 Patents Are Anticipated and/or Rendered Obvious by the Prior Art.

Some or all of the Asserted Claims of the Family 2 Patents are invalid as anticipated and/or rendered obvious under 35 U.S.C. §§ 102 and/or 103 in view of each of the primary prior art references identified in the claim charts included in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F, which identify specific examples of where each limitation of the Asserted Claims is found in the prior art references. As explained above, the cited portions of prior art references identified in the attached claim charts are exemplary in nature and representative of the content and teaching of the prior art references, and should be understood in the context of the reference as a whole and as they would be understood by a person of ordinary skill in the art.

The Nokia Defendants identify the following references as anticipating and/or rendering obvious one or more of the Asserted Claims of the Family 2 Patents under 35 U.S.C. §§ 102 and/or

103. The table of anticipating and/or rendering obvious references below is exemplary, and it does not constitute an admission that any reference not listed below does not also anticipate and/or render obvious the claims of the Family 2 Patents. Further, Nokia Defendants contend that any prior art reference in the attached charts that is charted for each limitation of any given claim, anticipates that claim, regardless of whether that prior art reference is listed in the following table.

Exhibit	Primary Prior Art	Date
F2-014A F2-193A F2-601A	U.S. Patent No. 6,222,858 to Counterman (“Counterman”)	February 10, 1999
F2-014B F2-193B F2-601B	U.S. Patent No. 7,068,657 to Keller-Tuberg (“Keller-Tuberg”)	April 24, 2001
F2-014C F2-193C F2-601C	WO 99/39468 to Edvardsen (“Edvardsen”)	August 5, 1999
F2-014D F2-193D F2-601D	ATM Forum Technical Committee issued its Inverse Multiplexing over ATM (IMA) Specification Version 1.0, AF-PHY-0086.000, July 1997 (“IMA Specification 1.0”)	July 1997
F2-014E F2-193E F2-601E	U.S. Patent No. 8,178,448 to Gray (“Gray”)	June 18, 1997
F2-014F F2-193F F2-601F	U.S. Patent No. 5,799,014 to Kozaki (“Kozaki”)	September 16, 1994, or, in the alternative, August 25, 1998

To the extent any item of prior art cited above is deemed not to disclose and/or render obvious, explicitly or inherently, any limitation of an Asserted Claim of the Family 2 Patents, the Nokia Defendants reserve the right to argue that any difference between that prior art and the corresponding patent claim would have been either inherent in the art or obvious to a person of ordinary skill in the art, even if Nokia Defendants have not specifically denoted that the art is to be combined with the knowledge of a person of ordinary skill in the art.

3. The Family 2 Patents Are Obvious Over the Prior Art.

To the extent TQ Delta argues that any limitation of the Asserted Claims of the Family 2 Patents are not explicitly disclosed and/or rendered obvious by an item of prior art identified above and in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014, any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. The item of prior art would, therefore, render such claims invalid as obvious under 35 U.S.C. § 103.

a) The Claims Are Obvious Over the Primary References in Light of One or More Secondary References.

To the extent the foregoing references are found not to anticipate and/or render obvious the Asserted Claims of the Family 2 Patents, the foregoing references render the Asserted Claims obvious, either alone or in combination with one or more of the other references identified above. One of ordinary skill in the art would have been motivated to combine the various references cited above and herein so as to disclose each and every limitation of the Asserted Claims of the Family 2 Patents.

Prior art references rendering the Asserted Claims of the Family 2 Patents obvious, either alone or in combination with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-

601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014, are provided in the tables above and below and in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014. The prior art identified in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F render one or more asserted claims of the Family 2 Patents obvious when the references are read in combination with one or more of each other, when read in combination with any of the prior art identified in F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014, and/or when read in view of the state of the art and knowledge of those skilled in the art.

F2 Secondary Exhibits	Date
ITU-T Recommendation G.992.1 (06/99) (“ITU-T G.992.1”)	June 1999
ITU-T Recommendation G.997.1 (06/99) (“ITU-T G.997.1”)	June 1999
U.S. Patent No. 6,002,670 to Rahman (“Rahman”)	December 12, 1997
U.S. Patent No. 6,956,872 to Djokovic (“Djokovic”)	August 18, 2000
U.S. Patent No. 6,665,733 to Witkowski (“Witkowski”)	September 23, 1997
U.S. Patent No. 6,772,388 to Cooper (“Cooper”)	December 6, 2000

To the extent TQ Delta argues that any Asserted Claim of the Family 2 Patents is not disclosed or rendered obvious by any Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F, the Asserted Claims nevertheless would have been obvious in light of one or more other Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F references and/or one or more references identified and charted in Exhibits F2 Secondary-193, F2 Secondary-601,

F2 Secondary - 014 and in view of the knowledge, experience, and understanding of persons of ordinary skill in the art.

Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with another to render obvious (and therefore invalid) each of TQ Delta's Asserted Claims. The Nokia Defendants may rely on a subset of (or all of) the above-identified references, including all references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014, for purposes of obviousness depending on the Court's claim construction, positions taken by TQ Delta during this litigation, and further investigation and discovery.

b) Exemplary Combinations of the Prior Art.

The table below provides an identification of exemplary combinations of prior art references that, based on Nokia Defendants' present understanding of TQ Delta's Preliminary Infringement Contentions and apparent reading of the Asserted Claims, render obvious one or more of the Asserted Claims of the Family 2 Patents. The combinations of references identified below are non-exhaustive, and additional examples are apparent from other combinations of references addressed in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014. Nokia Defendants expressly note that, although certain references charted in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F are listed variously in the left or right column below, Nokia Defendants do not thereby imply any restriction as to which Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F reference is primary and which Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F reference is secondary in such a combination. The Nokia Defendants

reserve the right to rely on either identified reference in the identified combinations as a primary and/or secondary reference.

Reference	Combination References
U.S. Patent No. 6,222,858 to Counterman (“Counterman”)	Keller-Tuberg, Edvardsen, IMA Specification 1.0, Gray, Kozaki, and/or one or more references as charted in F2 Secondary-193, F2 Secondary-601, and F2 Secondary - 014
U.S. Patent No. 7,068,657 to Keller-Tuberg (“Keller-Tuberg”)	Counterman, Edvardsen, IMA Specification 1.0, Gray, Kozaki, and/or one or more references as charted in Exhibit F2 Secondary-193, F2 Secondary-601, and F2 Secondary - 014
WO 99/39468 to Edvardsen (“Edvardsen”)	Counterman, Keller-Tuberg, IMA Specification 1.0, Gray, Kozaki, and/or one or more references as charted in Exhibit F2 Secondary-193, F2 Secondary-601, and F2 Secondary - 014
ATM Forum Technical Committee issued its Inverse Multiplexing over ATM (IMA) Specification Version 1.0, AF-PHY-0086.000, July 1997 (“IMA Specification 1.0”)	Counterman, Keller-Tuberg, Edvardsen, Gray, Kozaki, and/or one or more references as charted in Exhibit F2 Secondary-193, F2 Secondary-601, and F2 Secondary - 014
U.S. Patent No. 8,178,448 to Gray (“Gray”)	Counterman, Keller-Tuberg, Edvardsen, IMA Specification 1.0, Kozaki, and/or one or more references as charted in Exhibit F2 Secondary-193, F2 Secondary-601, and F2 Secondary - 014
U.S. Patent No. 5,799,014 to Kozaki (“Kozaki”)	Counterman, Keller-Tuberg, Edvardsen, IMA Specification 1.0, Gray, and/or one or more references as charted in Exhibit F2 Secondary-193, F2 Secondary-601, and F2 Secondary - 014

It would have been obvious to combine these references for reasons that are readily apparent to one of ordinary skill in the art, and for reasons explained herein.

c) Prior Art Solutions

In addition to the exemplary combinations provided above, to the extent TQ Delta alleges the references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 do not disclose any particular limitation of the Asserted Claims of the Family 2 Patents, either expressly or inherently, it would have been obvious to a person of ordinary skill in the art as of the alleged invention date of the Family 2 Patents to modify the references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary – 014 and/or combine the teachings of the references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary – 014 with the other prior art references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary – 014 in a manner that would have rendered the Asserted Claims invalid as obvious. Nokia Defendants provide examples of such combinations below. The exemplary combinations below are non-exhaustive, and Nokia Defendants reserve the right to rely on additional combinations as may be apparent from the prior art references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014. These obviousness combinations should not be construed to suggest that any reference included in any combination is not anticipatory in its own right.

(1) Exemplary Counterman Solutions

A person of ordinary skill in the art would be motivated to combine Counterman with Keller-Tuberg for many reasons. For example, Counterman describes a “method for inverse multiplexing for ATM and for link grouping of communication links with different transmission rates and delay.” *See, e.g.*, Counterman at Abstract. A person having ordinary skill in the art would

have been motivated to modify the method of Counterman to implement the details of “receiving a stream of sequentially aligned ATM cells” that are “sequence identified” taught by Keller-Tuberg because, it is also directed at inverse multiplexing via communication links having different transmission rates. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “overcoming limitations associated with facilitating IMA via IM communication links.” Keller-Tuberg at 3:32-35. In addition, a person of ordinary skill in the art would be motivated to combine Counterman with Keller-Tuberg because (a) Counterman and Keller-Tuberg disclose similar methods for inverse multiplexing, (b) Keller-Tuberg was originally filed by Alcatel SA, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods directed toward improving DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Keller-Tuberg’s teachings with those of Counterman. For similar reasons, a person of ordinary skill in the art would be motivated to combine Counterman with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary – 014 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Counterman with Edvardsen for many reasons. For example, Counterman describes a “method for inverse multiplexing for ATM and for link grouping of communication links with different transmission rates and delay.” *See, e.g.*, Counterman at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Counterman to implement the details of “inverse multiplexers (IM) in network nodes (CAB) in order to utilize the aggregated bandwidth from groups of twisted pair lines” taught by Edvardsen because it is also directed at “inverse

multiplexing.” Edvardsen at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of an “existing copper cable network” and increased capacity. Edvardsen at 1. In addition, a person of ordinary skill in the art would be motivated to combine Counterman with Edvardsen because (a) Counterman and Edvardsen disclose similar products, such as systems and methods for providing DSL to subscribers and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to increased transmission rates. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Edvardsen’s teachings with those of Counterman. For similar reasons, a person of ordinary skill in the art would be motivated to combine Counterman with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Counterman with IMA Specification 1.0 for many reasons. For example, Counterman describes a “method for inverse multiplexing for ATM and for link grouping of communication links with different transmission rates and delay.” *See, e.g.*, Counterman at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Counterman to implement the details of “inverse multiplexing of an ATM cell stream over multiple physical links” taught by IMA Specification 1.0 because, it is also directed at “inverse multiplexing.” IMA Specification 1.0 at 12, Introduction. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the increased bandwidths. IMA Specification 1.0 at 12, 1.1 Overview of Inverse Multiplexing for ATM. In addition, a person of ordinary skill in the art would be motivated to combine Counterman with IMA Specification 1.0 because (a) Counterman and IMA Specification 1.0 disclose similar products, such as methods used in providing DSL to subscribers at an increased

speed and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating IMA Specification 1.0's teachings with those of Counterman. For similar reasons, a person of ordinary skill in the art would be motivated to combine Counterman with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Counterman with Gray for many reasons. For example, Counterman describes a “method for inverse multiplexing for ATM and for link grouping of communication links with different transmission rates and delay.” *See, e.g.*, Counterman at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Counterman to implement the details of “link scheduling” taught by Gray because, it is also directed at “improved communication availability.” Gray at 1:39. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “high speed data routing.” Gray at 2:1. In addition, a person of ordinary skill in the art would be motivated to combine Counterman with Gray because (a) Counterman and Gray disclose similar products, such as methods used in providing DSL to subscribers at an increased speed and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Gray's teachings with those of Counterman. For similar reasons, a person of ordinary skill in the art would be motivated to combine Counterman with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary – 014 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Counterman with Kozaki for many reasons. For example, Counterman describes a “method for inverse multiplexing for ATM and for link grouping of communication links with different transmission rates and delay.” *See, e.g.*, Counterman at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Counterman to implement the details of “ATM cell switching system” taught by Kozaki because, it is also directed at increased transmission capacity over multiple paths. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “accommodating a plurality of types of input-output links having different transmission rates.” Kozaki at 1:33-35. In addition, a person of ordinary skill in the art would be motivated to combine Counterman with Kozaki because (a) Counterman and Kozaki disclose similar products, such as systems for increased bandwidth and high speed transmission of data; (b) Kozaki is assigned to Hitachi, Ltd., a manufacturer in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to high speed transmission of data. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kozaki’s teachings with those of Counterman. For similar reasons, a person of ordinary skill in the art would be motivated to combine Counterman with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

(2) Exemplary Keller-Tuberg Solutions

A person of ordinary skill in the art would be motivated to combine Keller-Tuberg with Counterman for many reasons. For example, Keller-Tuberg describes a method of “facilitating inverse multiplexing over asynchronous transfer mode.” Keller-Tuberg at Abstract. A person

having ordinary skill in the art would have been motivated to modify the method of Keller-Tuberg to implement the details of “method for inverse multiplexing for ATM and for link grouping of communication links with different transmission rates and delay” taught by Counterman because, it is also directed at inverse multiplexing via communication links having different transmission rates. Counterman at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “shar[ing] common carrier communication links on a demand driven, as needed basis” with increased capacity. Counterman at 1:39-42, 4:1-7. In addition, a person of ordinary skill in the art would be motivated to combine Keller-Tuberg with Counterman because (a) Keller-Tuberg and Counterman disclose similar methods for inverse multiplexing, (b) Keller-Tuberg was originally filed by Verizon Laboratories Inc., a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods directed toward improving DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Counterman’s teachings with those of Keller-Tuberg. For similar reasons, a person of ordinary skill in the art would be motivated to combine Keller-Tuberg with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Keller-Tuberg with Edvardsen for many reasons. For example, Keller-Tuberg describes a method of “facilitating inverse multiplexing over asynchronous transfer mode.” Keller-Tuberg at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Keller-Tuberg to implement the details of “inverse multiplexers (IM) in network nodes (CAB) in order to utilize

the aggregated bandwidth from groups of twisted pair lines” taught by Edvardsen because it is also directed at “inverse multiplexing.” Edvardsen at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of an “existing copper cable network” and increased capacity. Edvardsen at 1. In addition, a person of ordinary skill in the art would be motivated to combine Keller-Tuberg with Edvardsen because (a) Keller-Tuberg and Edvardsen disclose similar products, such as systems and methods for providing DSL to subscribers and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to increased transmission rates. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Edvardsen’s teachings with those of Keller-Tuberg. For similar reasons, a person of ordinary skill in the art would be motivated to combine Keller-Tuberg with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Keller-Tuberg with IMA Specification 1.0 for many reasons. For example, Keller-Tuberg describes a method of “facilitating inverse multiplexing over asynchronous transfer mode.” Keller-Tuberg at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Keller-Tuberg to implement the details of “inverse multiplexing of an ATM cell stream over multiple physical links” taught by IMA Specification 1.0 because, it is also directed at “inverse multiplexing.” IMA Specification 1.0 at 12, Introduction. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the increased bandwidths. IMA Specification 1.0 at 12, 1.1 Overview of Inverse Multiplexing for ATM. In addition, a person of ordinary skill in the art would be motivated to combine Keller-Tuberg with IMA Specification

1.0 because (a) Keller-Tuberg and IMA Specification 1.0 disclose similar products, such as methods used in providing DSL to subscribers at an increased speed and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating IMA Specification 1.0's teachings with those of Keller-Tuberg. For similar reasons, a person of ordinary skill in the art would be motivated to combine Keller-Tuberg with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Keller-Tuberg with Gray for many reasons. For example, Keller-Tuberg describes a method of “facilitating inverse multiplexing over asynchronous transfer mode.” Keller-Tuberg at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Keller-Tuberg to implement the details of “link scheduling” taught by Gray because, it is also directed at “improved communication availability.” Gray at 1:39. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “high speed data routing.” Gray at 2:1. In addition, a person of ordinary skill in the art would be motivated to combine Keller-Tuberg with Gray because (a) Keller-Tuberg and Gray disclose similar products, such as methods used in providing DSL to subscribers at an increased speed and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Gray's teachings with those of Keller-Tuberg. For similar reasons, a person of ordinary skill in the art would be motivated to combine Keller-Tuberg with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F,

F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Keller-Tuberg with Kozaki for many reasons. For example, Keller-Tuberg describes a method of “facilitating inverse multiplexing over asynchronous transfer mode.” Keller-Tuberg at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Keller-Tuberg to implement the details of “ATM cell switching system” taught by Kozaki because, it is also directed at increased transmission capacity over multiple paths. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “accommodating a plurality of types of input-output links having different transmission rates.” Kozaki at 1:33-35. In addition, a person of ordinary skill in the art would be motivated to combine Keller-Tuberg with Kozaki because (a) Keller-Tuberg and Kozaki disclose similar products, such as systems for increased bandwidth and high speed transmission of data; (b) Kozaki is assigned to Hitachi, Ltd., a manufacturer in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to high speed transmission of data. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kozaki’s teachings with those of Keller-Tuberg. For similar reasons, a person of ordinary skill in the art would be motivated to combine Keller-Tuberg with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

(3) Exemplary Edvardsen Solutions

A person of ordinary skill in the art would be motivated to combine Edvardsen with Counterman for many reasons. For example, Edvardsen describes a method of “inverse multiplexers (IM) in network nodes (CAB) in order to utilize the aggregated bandwidth from groups of twisted pair lines.” Edvardsen at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Edvardsen to implement the details of “method for inverse multiplexing for ATM and for link grouping of communication links with different transmission rates and delay” taught by Counterman because, it is also directed at inverse multiplexing via communication links having different transmission rates. Counterman at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “shar[ing] common carrier communication links on a demand driven, as needed basis” with increased capacity. Counterman at 1:39-42, 4:1-7. In addition, a person of ordinary skill in the art would be motivated to combine Edvardsen with Counterman because (a) Edvardsen and Counterman disclose similar methods for inverse multiplexing; (b) Edvardsen was originally filed by Verizon Laboratories Inc., a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods directed toward improving DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Counterman’s teachings with those of Edvardsen. For similar reasons, a person of ordinary skill in the art would be motivated to combine Edvardsen with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Edvardsen with Keller-Tuberg for many reasons. For example, Edvardsen describes a method of “inverse multiplexers (IM) in network nodes (CAB) in order to utilize the aggregated bandwidth from groups of twisted pair lines.” Edvardsen at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Edvardsen to implement the details of “receiving a stream of sequentially aligned ATM cells” that are “sequence identified” taught by Keller-Tuberg because, it is also directed at inverse multiplexing via communication links having different transmission rates. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “overcoming limitations associated with facilitating IMA via IM communication links.” Keller-Tuberg at 3:32-35. In addition, a person of ordinary skill in the art would be motivated to combine Edvardsen with Keller-Tuberg because (a) Edvardsen and Keller-Tuberg disclose similar methods for inverse multiplexing, (b) Keller-Tuberg was originally filed by Alcatel SA, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to methods directed toward improving DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Keller-Tuberg’s teachings with those of Edvardsen. For similar reasons, a person of ordinary skill in the art would be motivated to combine Edvardsen with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Edvardsen with IMA Specification 1.0 for many reasons. For example, Edvardsen describes a method of “inverse multiplexers (IM) in network nodes (CAB) in order to utilize the aggregated bandwidth from

groups of twisted pair lines.” Edvardsen at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Edvardsen to implement the details of “inverse multiplexing of an ATM cell stream over multiple physical links” taught by IMA Specification 1.0 because, it is also directed at “inverse multiplexing.” IMA Specification 1.0 at 12, Introduction. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the increased bandwidths. IMA Specification 1.0 at 12, 1.1 Overview of Inverse Multiplexing for ATM. In addition, a person of ordinary skill in the art would be motivated to combine Edvardsen with IMA Specification 1.0 because (a) Edvardsen and IMA Specification 1.0 disclose similar products, such as methods used in providing DSL to subscribers at an increased speed and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating IMA Specification 1.0’s teachings with those of Edvardsen. For similar reasons, a person of ordinary skill in the art would be motivated to combine Edvardsen with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Edvardsen with Gray for many reasons. For example, Edvardsen describes a method of “inverse multiplexers (IM) in network nodes (CAB) in order to utilize the aggregated bandwidth from groups of twisted pair lines.” Edvardsen at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Edvardsen to implement the details of “link scheduling” taught by Gray because, it is also directed at “improved communication availability.” Gray at 1:39. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “high speed data routing.” Gray at 2:1. In addition, a person of ordinary skill in the art would be

motivated to combine Edvardsen with Gray because (a) Edvardsen and Gray disclose similar products, such as methods used in providing DSL to subscribers at an increased speed and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Gray's teachings with those of Edvardsen. For similar reasons, a person of ordinary skill in the art would be motivated to combine Edvardsen with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Edvardsen with Kozaki for many reasons. For example, Edvardsen describes a method of “inverse multiplexers (IM) in network nodes (CAB) in order to utilize the aggregated bandwidth from groups of twisted pair lines.” Edvardsen at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Edvardsen to implement the details of “ATM cell switching system” taught by Kozaki because, it is also directed at increased transmission capacity over multiple paths. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “accommodating a plurality of types of input-output links having different transmission rates.” Kozaki at 1:33-35. In addition, a person of ordinary skill in the art would be motivated to combine Edvardsen with Kozaki because (a) Edvardsen and Kozaki disclose similar products, such as systems for increased bandwidth and high speed transmission of data; (b) Kozaki is assigned to Hitachi, Ltd., a manufacturer in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to high speed transmission of data. Moreover, a POSITA would have had a reasonable expectation of success in incorporating

Kozaki's teachings with those of Edvardsen. For similar reasons, a person of ordinary skill in the art would be motivated to combine Edvardsen with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

(4) Exemplary IMA Specification Solutions

A person of ordinary skill in the art would be motivated to combine IMA Specification 1.0 with Counterman for many reasons. For example, IMA Specification 1.0 describes a method of “inverse multiplexing of an ATM cell stream over multiple physical links.” IMA Specification 1.0 at 12, Introduction. A person having ordinary skill in the art would have been motivated to modify the method of IMA Specification 1.0 to implement the details of “method for inverse multiplexing for ATM and for link grouping of communication links with different transmission rates and delay” taught by Counterman because, it is also directed at inverse multiplexing via communication links having different transmission rates. Counterman at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “shar[ing] common carrier communication links on a demand driven, as needed basis” with increased capacity. Counterman at 1:39-42, 4:1-7. In addition, a person of ordinary skill in the art would be motivated to combine IMA Specification 1.0 with Counterman because (a) IMA Specification 1.0 and Counterman disclose similar methods for inverse multiplexing; (b) IMA Specification 1.0 was originally filed by Verizon Laboratories Inc., a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to methods directed toward improving DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Counterman's teachings with those

of IMA Specification 1.0. For similar reasons, a person of ordinary skill in the art would be motivated to combine IMA Specification 1.0 with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

A person of ordinary skill in the art would be motivated to combine IMA Specification 1.0 with Keller-Tuberg for many reasons. For example, IMA Specification 1.0 describes a method of “inverse multiplexing of an ATM cell stream over multiple physical links.” IMA Specification 1.0 at 12, Introduction. A person having ordinary skill in the art would have been motivated to modify the method of IMA Specification 1.0 to implement the details of “receiving a stream of sequentially aligned ATM cells” that are “sequence identified” taught by Keller-Tuberg because, it is also directed at inverse multiplexing via communication links having different transmission rates. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “overcoming limitations associated with facilitating IMA via IM communication links.” Keller-Tuberg at 3:32-35. In addition, a person of ordinary skill in the art would be motivated to combine IMA Specification 1.0 with Keller-Tuberg because (a) IMA Specification 1.0 and Keller-Tuberg disclose similar methods for inverse multiplexing; (b) Keller-Tuberg was originally filed by Alcatel SA, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to methods directed toward improving DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Keller-Tuberg’s teachings with those of IMA Specification 1.0. For similar reasons, a person of ordinary skill in the art would be motivated to combine IMA Specification 1.0 with other

references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

A person of ordinary skill in the art would be motivated to combine IMA Specification 1.0 with Edvardsen for many reasons. For example, IMA Specification 1.0 describes a method of “inverse multiplexing of an ATM cell stream over multiple physical links.” IMA Specification 1.0 at 12, Introduction. A person having ordinary skill in the art would have been motivated to modify the method of IMA Specification 1.0 to implement the details of “inverse multiplexers (IM) in network nodes (CAB) in order to utilize the aggregated bandwidth from groups of twisted pair lines” taught by Edvardsen because it is also directed at “inverse multiplexing.” Edvardsen at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of an “existing copper cable network” and increased capacity. Edvardsen at 1. In addition, a person of ordinary skill in the art would be motivated to combine IMA Specification 1.0 with Edvardsen because (a) IMA Specification 1.0 and Edvardsen disclose similar products, such as systems and methods for providing DSL to subscribers and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to increased transmission rates. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Edvardsen’s teachings with those of IMA Specification 1.0. For similar reasons, a person of ordinary skill in the art would be motivated to combine IMA Specification 1.0 with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

A person of ordinary skill in the art would be motivated to combine IMA Specification 1.0 with Gray for many reasons. For example, IMA Specification 1.0 describes a method of “inverse

multiplexing of an ATM cell stream over multiple physical links.” IMA Specification 1.0 at 12, Introduction. A person having ordinary skill in the art would have been motivated to modify the method of IMA Specification 1.0 to implement the details of “link scheduling” taught by Gray because, it is also directed at “improved communication availability.” Gray at 1:39. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “high speed data routing.” Gray at 2:1. In addition, a person of ordinary skill in the art would be motivated to combine IMA Specification 1.0 with Gray because (a) IMA Specification 1.0 and Gray disclose similar products, such as methods used in providing DSL to subscribers at an increased speed and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Gray’s teachings with those of IMA Specification 1.0. For similar reasons, a person of ordinary skill in the art would be motivated to combine IMA Specification 1.0 with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

A person of ordinary skill in the art would be motivated to combine IMA Specification 1.0 with Kozaki for many reasons. For example, IMA Specification 1.0 describes a method of “inverse multiplexing of an ATM cell stream over multiple physical links.” IMA Specification 1.0 at 12, Introduction. A person having ordinary skill in the art would have been motivated to modify the method of IMA Specification 1.0 to implement the details of “ATM cell switching system” taught by Kozaki because, it is also directed at increased transmission capacity over multiple paths. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “accommodating a plurality of types of input-output links having different transmission rates.”

Kozaki at 1:33-35. In addition, a person of ordinary skill in the art would be motivated to combine IMA Specification 1.0 with Kozaki because (a) IMA Specification 1.0 and Kozaki disclose similar products, such as systems for increased bandwidth and high speed transmission of data; (b) Kozaki is assigned to Hitachi, Ltd., a manufacturer in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to high speed transmission of data. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kozaki's teachings with those of IMA Specification 1.0. For similar reasons, a person of ordinary skill in the art would be motivated to combine IMA Specification 1.0 with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

(5) Exemplary Gray Solutions

A person of ordinary skill in the art would be motivated to combine Gray with Counterman for many reasons. For example, Gray describes a method of “optimal link scheduling for multiple links by obtaining and utilizing link quality information.” Gray at Title. A person having ordinary skill in the art would have been motivated to modify the method of Gray to implement the details of “method for inverse multiplexing for ATM and for link grouping of communication links with different transmission rates and delay” taught by Counterman because, it is also directed at inverse multiplexing via communication links having different transmission rates. Counterman at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “shar[ing] common carrier communication links on a demand driven, as needed basis” with increased capacity. Counterman at 1:39-42, 4:1-7. In addition, a person of ordinary skill in the art would be motivated to combine Gray with Counterman because (a) Gray

and Counterman disclose similar methods for inverse multiplexing, (b) Gray was originally filed by Verizon Laboratories Inc., a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods directed toward improving DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Counterman's teachings with those of Gray. For similar reasons, a person of ordinary skill in the art would be motivated to combine Gray with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Gray with Keller-Tuberg for many reasons. For example, Gray describes a method of “optimal link scheduling for multiple links by obtaining and utilizing link quality information.” Gray at Title. Gray at 12, Introduction. A person having ordinary skill in the art would have been motivated to modify the method of Gray to implement the details of “receiving a stream of sequentially aligned ATM cells” that are “sequence identified” taught by Keller-Tuberg because, it is also directed at inverse multiplexing via communication links having different transmission rates. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “overcoming limitations associated with facilitating IMA via IM communication links.” Keller-Tuberg at 3:32-35. In addition, a person of ordinary skill in the art would be motivated to combine Gray with Keller-Tuberg because (a) Gray and Keller-Tuberg disclose similar methods for inverse multiplexing, (b) Keller-Tuberg was originally filed by Alcatel SA, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for

example, both relate to methods directed toward improving DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Keller-Tuberg's teachings with those of Gray. For similar reasons, a person of ordinary skill in the art would be motivated to combine Gray with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Gray with IMA Specification 1.0 for many reasons. For example, Gray describes a method of “optimal link scheduling for multiple links by obtaining and utilizing link quality information.” Gray at Title. A person having ordinary skill in the art would have been motivated to modify the method of Gray to implement the details of “inverse multiplexing of an ATM cell stream over multiple physical links” taught by IMA Specification 1.0 because, it is also directed at “inverse multiplexing.” IMA Specification 1.0 at 12, Introduction. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the increased bandwidths. IMA Specification 1.0 at 12, 1.1 Overview of Inverse Multiplexing for ATM. In addition, a person of ordinary skill in the art would be motivated to combine Gray with IMA Specification 1.0 because (a) Gray and IMA Specification 1.0 disclose similar products, such as methods used in providing DSL to subscribers at an increased speed and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating IMA Specification 1.0’s teachings with those of Gray. For similar reasons, a person of ordinary skill in the art would be motivated to combine Gray with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

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by the advantages of such functionality, such as “accommodating a plurality of types of input-output links having different transmission rates.” Kozaki at 1:33-35. In addition, a person of ordinary skill in the art would be motivated to combine Gray with Kozaki because (a) Gray and Kozaki disclose similar products, such as systems for increased bandwidth and high speed transmission of data; (b) Kozaki is assigned to Hitachi, Ltd., a manufacturer in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to high speed transmission of data. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kozaki’s teachings with those of Gray. For similar reasons, a person of ordinary skill in the art would be motivated to combine Gray with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

(6) Exemplary Kozaki Solutions

A person of ordinary skill in the art would be motivated to combine Kozaki with Counterman for many reasons. For example, Kozaki describes an ““ATM cell switching system.” Kozaki at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Kozaki to implement the details of “method for inverse multiplexing for ATM and for link grouping of communication links with different transmission rates and delay” taught by Counterman because, it is also directed at inverse multiplexing via communication links having different transmission rates. Counterman at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “shar[ing] common carrier communication links on a demand driven, as needed basis” with increased capacity. Counterman at 1:39-42, 4:1-7. In addition, a person of ordinary skill in the art would be motivated to combine

Kozaki with Counterman because (a) Kozaki and Counterman disclose similar methods for inverse multiplexing; (b) Kozaki was originally filed by Verizon Laboratories Inc., a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods directed toward improving DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Counterman's teachings with those of Kozaki. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kozaki with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kozaki with Keller-Tuberg for many reasons. For example, Kozaki describes an "ATM cell switching system." Kozaki at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Kozaki to implement the details of "receiving a stream of sequentially aligned ATM cells" that are "sequence identified" taught by Keller-Tuberg because, it is also directed at inverse multiplexing via communication links having different transmission rates. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "overcoming limitations associated with facilitating IMA via IM communication links." Keller-Tuberg at 3:32-35. In addition, a person of ordinary skill in the art would be motivated to combine Kozaki with Keller-Tuberg because (a) Kozaki and Keller-Tuberg disclose similar methods for inverse multiplexing, (b) Keller-Tuberg was originally filed by Alcatel SA, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods directed toward improving DSL. Moreover, a POSITA would have had a

reasonable expectation of success in incorporating Keller-Tuberg's teachings with those of Kozaki. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kozaki with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kozaki with Edvardsen for many reasons. For example, Kozaki describes an "ATM cell switching system." Kozaki at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Kozaki to implement the details of "inverse multiplexers (IM) in network nodes (CAB) in order to utilize the aggregated bandwidth from groups of twisted pair lines" taught by Edvardsen because it is also directed at "inverse multiplexing." Edvardsen at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of an "existing copper cable network" and increased capacity. Edvardsen at 1. In addition, a person of ordinary skill in the art would be motivated to combine Kozaki with Edvardsen because (a) Kozaki and Edvardsen disclose similar products, such as systems and methods for providing DSL to subscribers and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to increased transmission rates. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Edvardsen's teachings with those of Kozaki. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kozaki with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kozaki with IMA Specification 1.0 for many reasons. For example, Kozaki describes an "ATM cell switching system." Kozaki at Abstract. A person having ordinary skill in the art would have been motivated

to modify the method of Kozaki to implement the details of “inverse multiplexing of an ATM cell stream over multiple physical links” taught by IMA Specification 1.0 because, it is also directed at “inverse multiplexing.” IMA Specification 1.0 at 12, Introduction. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the increased bandwidths. IMA Specification 1.0 at 12, 1.1 Overview of Inverse Multiplexing for ATM. In addition, a person of ordinary skill in the art would be motivated to combine Kozaki with IMA Specification 1.0 because (a) Kozaki and IMA Specification 1.0 disclose similar products, such as methods used in providing DSL to subscribers at an increased speed and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating IMA Specification 1.0’s teachings with those of Kozaki. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kozaki with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kozaki with Gray for many reasons. For example, Kozaki describes an “ATM cell switching system.” Kozaki at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Kozaki to implement the details of “link scheduling” taught by Gray because, it is also directed at “improved communication availability.” Gray at 1:39. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “high speed data routing.” Gray at 2:1. In addition, a person of ordinary skill in the art would be motivated to combine Kozaki with Gray because (a) Kozaki and Gray disclose similar products, such as methods used in providing DSL to subscribers at an increased speed and (b) both patents are

analogous art and in the same field of endeavor as each other, for example, both relate to DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Gray's teachings with those of Kozaki. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kozaki with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

(7) Exemplary Obviousness References Solutions

A person of ordinary skill in the art would be motivated to combine Counterman, Keller-Tuberg, Edvardsen, IMA Specification 1.0, Gray, and Kozaki (the “Primary References”) with the Secondary References for many reasons. As described above, each of the primary references all teach methods or devices that increase DSL capacity or transmission rate to improve upon existing DSL technology. *See* Sections III.B.3.c)(1)-(7). A person having ordinary skill in the art would have been motivated to modify the method of the Primary References to implement the details of the Secondary References because they are also directed at methods to increase efficiency and transmission of data in DSL. For example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of “metallic twisted pair that allows high-speed data transmission between the network operator (ATU-C) and the customer end (ATU-R).” ITU-T G.992.1 at 1, Summary. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of “the physical layer management for ADSL transmission systems.” ITU-T G.992.1 at 1, 1 Scope. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of selection criteria to minimize delay and maximize bandwidth. Rahman at Abstract. As another example, a person of ordinary skill in the art would be motivated by the

advantages of such functionality, such as “increasing the use of telephone lines for high speed remote access to computer networks.” Djokovic at 1:35-58. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “port control circuitry for controlling packet flow between the ports” of a given device. Witkowski at Abstract. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as forward error correction with possible opportunities to “increase data throughput and decrease response latency.” Cooper at 2:63-65. In addition, a person of ordinary skill in the art would be motivated to combine any Primary Reference with and Secondary reference because (a) each reference discloses similar products, such as methods used in providing DSL to subscribers at an increased speed and (b) the references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the Secondary References’ teachings with those of the Primary References. For similar reasons, a person of ordinary skill in the art would be motivated to combine the Primary References with other references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 with similar teachings.

d) The Claims Recite Well-Known Concepts That Would Have Been Obvious to Implement.

The Asserted Claims represent nothing more than an arrangement of well-known concepts and features, and add nothing to the state of the art at the time of the alleged invention. For each of the concepts represented by the Asserted Claims, it would have been obvious to add to the teachings of any number of known products and references, including to the teachings of any of the primary references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary – 014 to the extent that such reference

is alleged to be missing such concept or feature. The following are examples of concepts that would have been obvious, which is not intended to be an exhaustive list of the claimed features that would have been obvious. Nokia Defendants reserve the right to supplement these examples as necessary.

- (1) It would have been obvious to modify any primary reference for a “transceiver[] operable to utilize at least one parameter associated with operation of at least one of the first and second transceivers to reduce a difference in latency.”

To the extent TQ Delta contends that any reference charted in Exhibits Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary – 014 does not disclose “transceivers are operable to utilize at least one parameter associated with operation of at least one of the first and second transceivers to reduce a difference in latency” it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014. A person having ordinary skill in the art would have been motivated to employ or implement that feature. *See, e.g.*, ITU-T G.992.1 at 5.1.1 (“An ADSL system supporting STM transport may be capable of operating in an optional dual latency mode for the upstream, in which user data is allocated to both paths (i.e. fast and interleaved).”); Rahman at Abstract (“According to some embodiments of the invention, the selection criteria are minimum delay and maximum bandwidth.”); *see also* Djokovic at 1:22-24 (“FEC in ADSL is rate adaptable, providing for various interleave depths and codework lengths to support a range of data rates while maintaining constant interleave latency.”). Employing such parameters to reduce latency would have accomplished “generat[ing] a high data rate connection for the transport of an ATM cell stream between the service provider” and DSL subscriber with reduced latency. Little or no complexity would have been involved in including the feature, as

adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(2) It would have been obvious to modify any primary reference to include 1) “a combination of bonded and unbonded transceivers” or 2) “first and second transceivers are connected to a multi-pair multiplexer” and “the third transceiver is not connected to the multipair multiplexer” in any configuration.

To the extent TQ Delta contends that any reference charted in Exhibits Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary – 014 does not disclose “a combination of bonded and unbonded transceivers” and transceivers in which one “transceiver is not connected to the multipair multiplexer,” it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014. A person having ordinary skill in the art would have been motivated to employ or implement that feature. *See, e.g.*, ’601 patent at 4:52-58 (“**Obviously** the ADSL PHYs operating the traditional way do not need to be connected to the multipair multiplexer 140. Thus, it should be appreciated that any combination of “bonded” and unbonded, i.e. traditional, ADSP PHY’s, may be configured between the access node 100 and the broadband network determination 200.”) (emphasis added); *see also* Witkowski at 19:13-16 (“The default VLAN bit map for each of the ports PORT0-PORT4 includes all of the non-bonded ports PORT0-PORT4 plus one of the bonded ports.”). Employing a combination of bonded and unbonded ports would have accomplished the desired goal of port configurations to “generat[ing] a high data rate connection for the transport of an ATM cell stream between the service provider” and DSL subscriber. Little or no complexity would have been involved in including the feature, as adding

the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(3) It would have been obvious to modify any primary reference to include VDSL and ADSL transceivers in any configuration.

To the extent TQ Delta contends that any reference charted in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 does not disclose a combination of VDSL and ADSL transceivers in any configuration it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014. A person having ordinary skill in the art would have been motivated to employ or implement that feature. *See, e.g.*, Counterman (“The term xDSL is used to refer to various digital subscriber line technologies, such as DSL, HDSL, HDSL2, ADSL and VDSL and others, which typically involve the transmission of data in the portion of the frequency spectrum above standard telephone service. xDSL lines may be used as the physical links for data transmission in an ATM network.”). Employing such parameters to reduce latency would have accomplished “generat[ing] a high data rate connection for the transport of an ATM cell stream between the service provider” and DSL subscriber with reduced latency. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

e) Additional Reasons to Combine.

In addition to the information contained elsewhere in these invalidity contentions, including in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014, Nokia Defendants have identified

additional motivations and reasons to combine the various references. Nokia Defendants note that in *KSR Int'l Co. v. Teleflex Inc.*, the Supreme Court held that “[i]n determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. What matters is the objective reach of the claim. If the claim extends to what is obvious, it is invalid under § 103.” 127 S. Ct. 1727, 1742 (2007).

KSR further illustrated several ways in which the subject matter of a patent claim may be shown to have been obvious. For instance, “[o]ne of the ways in which a patent’s subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent’s claims.” *KSR*, 127 S. Ct. at 1742. The Supreme Court held that it was error to “look only to the problem the patentee was trying to solve.” *Id.* As the Court explained, “[t]he question is not whether the combination was obvious to the patentee but whether the combination was obvious to a person with ordinary skill in the art. Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *Id.* Further, “[c]ommon sense teaches ... that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle.” *Id.* Further, a showing that a combination of elements was “obvious to try” may demonstrate that it was obvious under § 103. *Id.* For instance, the Supreme Court held that “predictable solutions” using a combination of “known options” may render the subject matter of a patent claim obvious. *Id.*

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is

likely the product was not of innovation but of ordinary skill and common sense. *Id.* The ways in which the subject matter of a patent claim may be shown to be obvious, identified by *KSR*, are merely illustrative. A core thrust of *KSR* was that “[r]igid preventative rules that deny factfinders recourse to common sense are neither necessary under our case law nor consistent with it.” *KSR*, 127 S. Ct. at 1742-43 (quoting *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1367 (Fed. Cir. 2006) (“Our suggestion test is in actuality quite flexible and not only permits, but requires, consideration of common knowledge and common sense”), and *Alza Corp. v. Mylan Labs., Inc.*, 464 F.3d 1286, 1291 (Fed. Cir. 2006) (“There is flexibility in our obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires an actual teaching to combine ...”).

Although Nokia Defendants note that there is no longer a rigid requirement regarding motivation to combine under *KSR*, Nokia Defendants provide the following statements regarding motivation to combine. Multiple teachings, suggestions, and/or reasons to modify any of the references and/or to combine any two or more of the references in Exhibits F2-193A - F2-193F, F2-601A – F2-601F, F2-014A – F2-014F and F2 Secondary-193, F2 Secondary-601, F2 Secondary - 014 come from many sources, including the prior art (specific and as a whole), common knowledge, common sense, predictability, expectations, industry trends, design incentives or need, market demands or pressure, market forces, obvious to try, the nature of the problem faced, and/or knowledge possessed by one of ordinary skill. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one.

The combination of prior art references identified in these contentions would have been obvious because the combination represents the known potential options with a reasonable expectation of success. Additionally, one of ordinary skill in the art would have been motivated to create combinations identified in these contentions using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or teaching, suggestion, or motivation in the prior art generally. Also, market forces in the industry, and the desire to improve features and performance, would motivate the addition of features to systems as they became available, became less expensive, became more commonly used, provided better performance, reduced costs, size or weight, or predictably achieved other desirable results.

C. Other Grounds for Invalidity

Nokia Defendants identify the following additional grounds for invalidity of the Asserted Claims of the Family 2 Patents. Nokia Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

1. Invalidity of the Family 2 Patents Based on 35 U.S.C. § 112, ¶ 1 (Enablement and Written Description)

Based on Nokia Defendants' present understanding of TQ Delta's asserted scope of the claims of the Family 2 Patents, to the extent such positions can be understood from TQ Delta's Preliminary Infringement Contentions, the Asserted Claims of the Family 2 Patents are invalid for reciting at least the following claim terms, phrases, or limitations that lack enablement or sufficient written description:

- “combination of bonded and unbonded transceivers” (’193 Patent, claims 1, 9; ’014 Patent, claim 1)
- “wherein first and the second transceivers are operable to utilize at least one parameter associated with operation of at least one of the first and second transceivers to reduce a

difference in latency between the first and second transceivers” (’193 Patent, claim 13; ’601 Patent, claims 14 and 21).

- “third transceiver is not bonded with any other transceiver” (’193 Patent, claims 1, 9; ’014 Patent, claim 1)
- “the device capable of bonding at least the first and second transceivers of the plurality of transceivers, while at least the third transceiver of the plurality of transceivers is not bonded with any other transceivers in the device” (’601 Patent, claim 15)
- “wherein the first and second transceivers are connected to a multi-pair multiplexer” (’601 Patent, claim 1)
- “wherein the first, second and third transceivers are connected to a virtual path/virtual channel multiplexer” (’601 Patent, claim 8)
- “the third transceiver is not connected to the multi-pair multiplexer” (’601 Patent, claims 9 and 15)
- “first and second transceivers are VDSL transceivers that are operable to transmit Internet Protocol (IP) packets, and wherein the third transceiver is a ADSL transceiver operable to transmit ATM cells” (’014 Patent, claim 1)

These claim terms, phrases, and limitations, as apparently construed by TQ Delta, fail to satisfy the enablement and/or written description requirements of 35 U.S.C. § 112. This is at least because the specifications of the Family 2 Patents demonstrate that the patentee neither conceived of nor demonstrated possession of all that TQ Delta now contends the claims cover. In addition, based on Defendant’s present understanding of TQ Delta’s Preliminary Infringement Contentions, each of the Asserted Claims of the Family 2 Patents in which these claim terms, phrases, and limitations appear is invalid because the specification fails to provide sufficient disclosure to enable a person of ordinary skill in the art to which the alleged invention pertains, or with which it is most nearly connected, to implement the alleged invention without undue experimentation.

2. Invalidity of the Family 2 Patents Based on 35 U.S.C. § 112, ¶ 2 (Indefiniteness)

Based on Nokia Defendants’ present understanding of TQ Delta’s asserted scope of the claims of the Family 2 Patents, to the extent such positions can be understood from TQ Delta’s

Preliminary Infringement Contentions, Nokia Defendants assert that the Asserted Claims of the Family 2 Patents are invalid for reciting at least the following indefinite claim terms, phrases, or limitations:

- “combination of bonded and unbonded transceivers” (’193 Patent, claims 1, 9; ’014 Patent, claim 1)
- “wherein first and the second transceivers are operable to utilize at least one parameter associated with operation of at least one of the first and second transceivers to reduce a difference in latency between the first and second transceivers” (’193 Patent, claim 13; ’601 Patent, claims 14 and 21)
- “third transceiver is not bonded with any other transceiver” (’193 Patent, claims 1, 9; ’014 Patent, claim 1)
- “the device capable of bonding at least the first and second transceivers of the plurality of transceivers, while at least the third transceiver of the plurality of transceivers is not bonded with any other transceivers in the device” (’601 Patent, claim 15)
- “wherein the first and second transceivers are connected to a multi-pair multiplexer” (’601 Patent, claim 1)
- “wherein the first, second and third transceivers are connected to a virtual path/virtual channel multiplexer” (’601 Patent, claim 8)
- “the third transceiver is not connected to the multi-pair multiplexer” (’601 Patent, claims 9 and 15)
- “first and second transceivers are VDSL transceivers that are operable to transmit Internet Protocol (IP) packets, and wherein the third transceiver is a ADSL transceiver operable to transmit ATM cells” (’014 Patent, claim 1)

These claim terms, phrases, and limitations, as apparently construed by TQ Delta, violate the definiteness requirements of 35 U.S.C. § 112.

Based on the Nokia Defendants’ present understanding of TQ Delta’s Preliminary Infringement Contentions, these claim terms, phrases, and limitations are indefinite because they are inconsistent with and broader than the alleged invention disclosed in the specification and during prosecution. And given TQ Delta’s apparent constructions of the claim terms, phrases, and limitations, persons of ordinary skill in the art at the time of the invention would not have

understood what is claimed with reasonable certainty, even when the claims are read in light of the specification and prosecution history.

3. Additional Grounds for Invalidity of the Family 2 Patents

In addition to the preceding invalidity contentions, Nokia Defendants reserve the right to assert that the Asserted Claims are invalid under 35 U.S.C. § 102(f) and/or § 102(g) in the event that Nokia Defendants obtain evidence that the named inventors of the Family 2 Patents did not invent (either alone or in conjunction with other parties) the subject matter claimed in the Family 2 Patents. Should Nokia Defendants obtain such evidence, Nokia Defendants will provide the name of the person(s) from whom and the circumstances under which the invention or any part of it was derived, and/or the circumstances surrounding the making of the invention before the patent application.

Nokia Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

IV. THE ASSERTED FAMILY 3 PATENTS ARE INVALID.

A. Identification of Prior Art

Nokia Defendants contend that the prior art references described and charted in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 anticipate and/or render obvious, alone or in combination, one or more of the Asserted Claims of the Family 3 Patents.

B. The Asserted Claims Are Anticipated and/or Rendered Obvious.

TQ Delta asserts claims 9, 13, 14, and 15 of 7,844,882 (“the ’882 Patent”); claims 10, 28, and 36 of 8,495,473 (“the ’5473 Patent”); claims 2, 3, and 4 of 9,547,608 (“the ’608 Patent”); claims 21, 22, and 23 of 10,409,510 (“the ’510 Patent”) against Nokia Defendants in this lawsuit.

These claims are invalid because the Family 3 Patents fail to meet one or more of the requirements for patentability. The individual bases for invalidity are provided below and in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510. Each of the prior art references, the underlying work, and/or the underlying apparatus or method qualifies as prior art under one or more sections of 35 U.S.C. §§ 102 and/or 103.

In an effort to focus the issues, Nokia Defendants have cited representative portions of identified references, even where a reference may contain additional disclosures or support for a particular claim element. Each and every disclosure of the same limitation in the same reference is not necessarily identified. In addition, persons of ordinary skill in the art generally read a prior art reference as a whole and in the context of other publications and literature and in the context of their knowledge as persons of ordinary skill in the art. Thus, to understand and interpret any specific statement or disclosure within a prior art reference, such persons would rely on other information within the reference, along with other publications and their general scientific knowledge and experience in the field. Thus, each prior art reference identified herein should be understood in the context of the reference itself, in conjunction with anything incorporated by reference or described as relevant technology by the reference, any documents that are referred to for further understanding by the reference, any system embodying the reference, and any testimony by those with knowledge of the reference, such as the named authors and inventors. Nokia Defendants may rely on uncited portions of the prior art references and on other publications and expert testimony to provide context, and as aids to understanding and interpreting the portions that are cited. Nokia Defendants may also rely on uncited portions of the prior art references, other disclosed publications, and the testimony of experts to establish that a person of ordinary skill in

the art would have been motivated to modify or combine certain of the cited references so as to render the claims obvious.

1. The Family 3 Patents Priority Date.

TQ Delta's Preliminary Infringement Contentions allege that the Asserted Claims of the Family 3 are entitled at least to the priority date of October 12, 2004, October 11, 2005, or April 16, 2010. To the extent TQ Delta alleges that any prior art relied on in these invalidity contentions does not qualify as prior art to an Asserted Patent, Nokia Defendants reserve the right to rebut those allegations (*e.g.*, by demonstrating an earlier relevant date for the challenged prior art and/or a later priority date for the Asserted Patent and/or Asserted Claim).

2. The Family 3 Patents Are Anticipated and/or Rendered Obvious by the Prior Art.

Some or all of the Asserted Claims of the Family 3 Patents are invalid as anticipated and/or rendered obvious under 35 U.S.C. §§ 102 and/or 103 in view of each of the primary prior art references identified in the claim charts included in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F, which identify specific examples of where each limitation of the Asserted Claims is found in the prior art references. As explained above, the cited portions of prior art references identified in the attached claim charts are exemplary in nature and representative of the content and teaching of the prior art references, and should be understood in the context of the reference as a whole and as they would be understood by a person of ordinary skill in the art.

Nokia Defendants identify the following references as anticipating and/or rendering obvious one or more of the Asserted Claims of the Family 3 Patents under 35 U.S.C. §§ 102 and/or 103. The table of anticipating and/or rendering obvious references below is exemplary, and it does not constitute an admission that any reference not listed below does not also anticipate and/or

render obvious the claims of the Family 3 Patents. Further, Nokia Defendants contend that any prior art reference in the attached charts that is charted for each limitation of any given claim, anticipates that claim, regardless of whether that prior art reference is listed in the following table.

Exhibits	Primary Prior Art	Date²
F3-882A F3-5473A F3-608A F3-510A	ITU-T SG15/Q4 contribution LB-031, titled “VDSL2 – Constraining the Interleaver Complexity” (“LB-031”)	June 11, 2004
F3-882B F3-5473B F3-608B F3-510B	ITU-T G.993.1 (6/2004), Very High Speed Digital Subscriber Line Transceivers (“G.993.1”)	June 2004
F3-882C F3-5473C F3-608C F3-510C	U.S. Patent No. 7,269,208 to Mazzoni (“Mazzoni”)	July 18, 2000, or, in the alternative, January 30, 2003, or, in the alternative, September 11, 2007.
F3-882D F3-5473D F3-608D F3-510D	U.S. Patent No. 6,707,822 to Fadavi-Ardekani et al. (“Fadavi-Ardekani”)	January 7, 2000, or, in the alternative, March 16, 2004.
F3-882E F3-5473E F3-608E F3-510E	U.S. Patent No. 6,484,283 to Stephen et al. (“Stephen”)	December 30, 1998, or, in the alternative, November 19, 2002.
F3-882F F3-5473F F3-608F	U.S. Patent App. Pub. No. 2005/0034046 to Berkman et al. (“Berkman”)	February 18, 2002, or, in the alternative, January 20, 2003, August 18, 2004, or, in the alternative, February 10, 2005

² Nokia Defendants reserve the right to identify additional bases for qualification as prior art for each of the identified references in the event that it is determined that the Asserted Patents are not entitled to the claimed priority date.

Exhibits	Primary Prior Art	Date²
F3-510F		

To the extent any item of prior art cited above is deemed not to disclose and/or render obvious, explicitly or inherently, any limitation of an Asserted Claim of the Family 3 Patents, Nokia Defendants reserve the right to argue that any difference between that prior art and the corresponding patent claim would have been either inherent in the art or obvious to a person of ordinary skill in the art, even if Nokia Defendants have not specifically denoted that the art is to be combined with the knowledge of a person of ordinary skill in the art.

3. The Family 3 Patents Are Obvious Over the Prior Art.

To the extent TQ Delta argues that any limitation of the Asserted Claims of the Family 3 Patents are not explicitly disclosed and/or rendered obvious by an item of prior art identified above and in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510, any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. The item of prior art would, therefore, render such claims invalid as obvious under 35 U.S.C. § 103.

a) The Claims Are Obvious Over the Primary References in Light of One or More Secondary References.

To the extent the foregoing references are found not to anticipate and/or render obvious the Asserted Claims of the Family 3 Patents, the foregoing references render the Asserted Claims obvious, either alone or in combination with one or more of the other references identified above. One of ordinary skill in the art would have been motivated to combine the various references cited

above and herein so as to disclose each and every limitation of the Asserted Claims of the Family 3 Patents.

Prior art references rendering the Asserted Claims of the Family 3 Patents obvious, either alone or in combination with other references in F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510, are provided in the tables above and below and in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510. The prior art identified in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F render one or more asserted claims of the Family 3 Patents obvious when the references are read in combination with one or more of each other, when read in combination with any of the prior art identified in Exhibits F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510, and/or when read in view of the state of the art and knowledge of those skilled in the art.

F3 Secondary Exhibits	Date
ITU-T Recommendation G.992.2 (June 1999) (“G.992.2”)	June 1999
The ITU-T Recommendation G.992.1 (June 1999) (“G.992.1”)	June 1999
U.S. Patent No. 5,912,898 to Khoury (“Khoury”)	February 27, 1997, or, in the alternative, June 15, 1999
U.S. Patent No. 7,200,169 to Suzuki (“Suzuki ‘169”)	April 2, 2003, or, in the alternative, December 4, 2003, or, in the alternative, April 3, 2007
U.S. Patent No. 6,775,320, to Tzannes et al. (“Tzannes”)	September 15, 2000, or, in the alternative, August 10, 2004
U.S. Patent No. 7,317,754, issued to Remy et al. (“Remy”)	January 12, 2004, or, in the alternative, January 8, 2008

F3 Secondary Exhibits	Date
U.S. Patent Pub. No. 2003/0063600, to Noma et al. (“Noma”)	July 1, 2002, or, in the alternative, April 3, 2003
Int. Pub. No. 2001/041341, to Yonge, et al. (“Yonge”)	December 6, 1999, or, in the alternative, June 7, 2001
U.S. Patent No. 7,227,890, to Moon, et al. (“Moon”)	April 30, 2002, or, in the alternative, June 5, 2007
U.S. Patent Publication 20010030998, by Yong (“Yong”)	December 16, 1999, or, in the alternative, October 18, 2001
U.S. Patent No. 6,345,071, issued to Hamdi (“Hamdi”)	September 11, 1998, or, in the alternative, February 5, 2002

To the extent TQ Delta argues that any Asserted Claim of the Family 3 Patents is not disclosed or rendered obvious by any Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F reference, the Asserted Claims nevertheless would have been obvious in light of one or more other Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F references and/or one or more references identified and charted in Exhibits F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 and in view of the knowledge, experience, and understanding of persons of ordinary skill in the art.

Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with another to render obvious (and therefore invalid) each of TQ Delta’s Asserted Claims. Nokia Defendants may rely on a subset of (or all of) the above-identified references, including all references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510, for purposes of

obviousness depending on the Court's claim construction, positions taken by TQ Delta during this litigation, and further investigation and discovery.

b) Exemplary Combinations of the Prior Art.

The table below provides an identification of exemplary combinations of prior art references that, based on Nokia Defendants' present understanding of TQ Delta's Preliminary Infringement Contentions and apparent reading of the Asserted Claims, render obvious one or more of the Asserted Claims of the Family 3 Patents. The combinations of references identified below are non-exhaustive, and additional examples are apparent from other combinations of references addressed in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510. Nokia Defendants expressly note that, although certain references charted in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F are listed variously in the left or right column below, Nokia Defendants do not thereby imply any restriction as to which Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F reference is primary and which Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F reference is secondary in such a combination. Nokia Defendants reserve the right to rely on either identified reference in the identified combinations as a primary and/or secondary reference.

Reference	Combination References
ITU-T SG15/Q4 contribution LB-031, titled “VDSL2 – Constraining the Interleaver Complexity” (“LB-031”)	G.993.1, Mazzoni, Fadavi-Ardekani, Stephen, Berkmann, and/or one or more references as charted in Exhibits F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510
ITU-T G.993.1 (6/2004), Very High Speed Digital Subscriber Line Transceivers (“G.993.1”)	LB-031, Mazzoni, Fadavi-Ardekani, Stephen, Berkmann, and/or one or more references as charted in Exhibits F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510
U.S. Patent No. 7,269,208 to Mazzoni (“Mazzoni”)	LB-031, G.993.1, Fadavi-Ardekani, Stephen, Berkmann, and/or one or more references as charted in Exhibits F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510
U.S. Patent No. 6,707,822 to Fadavi-Ardekani et al. (“Fadavi-Ardekani”)	LB-031, G.993.1, Mazzoni, Stephen, Berkmann, and/or one or more references as charted in Exhibits F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510
U.S. Patent No. 6,484,283 to Stephen et al. (“Stephen”)	LB-031, G.993.1, Mazzoni, Fadavi-Ardekani, Berkmann, and/or one or more references as charted in Exhibits F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510
U.S. Patent App. Pub. No. 2005/0034046 to Berkmann et al. (“Berkmann”)	LB-031, G.993.1, Mazzoni, Fadavi-Ardekani, Stephen, and/or one or more references as charted in Exhibits F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510

It would have been obvious to combine these references for reasons that are readily apparent to one of ordinary skill in the art, and for reasons explained herein.

c) Prior Art Solutions

In addition to the exemplary combinations provided above, to the extent TQ Delta alleges the references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 do not disclose any particular limitation of the Asserted Claims of the Family 3 Patents, either expressly or inherently, it would have been obvious to a person of ordinary skill in the art as of the alleged invention date of the Family 3 Patents to modify the references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 and/or combine the teachings of the references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with the other prior art references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 in a manner that would have rendered the Asserted Claims invalid as obvious. Nokia Defendants provide examples of such combinations below. The exemplary combinations below are non-exhaustive, and Nokia Defendants reserve the right to rely on additional combinations as may be apparent from the prior art references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510. These obviousness combinations should not be construed to suggest that any reference included in any combination is not anticipatory in its own right.

(1) Exemplary LB-031 Solutions

A person of ordinary skill in the art would have been motivated to combine LB-031 with G.993.1 for many reasons. First, both LB-031 and G.993.1 describe standards for VDSL transceivers, so a person of ordinary skill in the art would have been motivated to consider them together. For example, LB-031 describes a method of restricting interleaver delay to restrict interleaver memory. LB-031 at 1. Specifically, LB-031 explains that “it seems prudent to define the interleaver complexity requirements in a way that will allow those who want to deploy VDSL2 at lower speeds to do so at a reduced complexity with respect to higher speed implementations.” LB-031 at 3. A person of ordinary skill would have been motivated to modify the method of LB-031 to implement the details of “interleaving” as described in G.993.1, such as, for example, using interleaving “to protect the data against bursts of errors by spreading the errors over a number of Reed-Solomon codewords,” and setting various interleave parameters to define “error correction” and “end-to-end delay.” G.993.1 at 15-16. A person of ordinary skill would have been motivated by the advantages of such functionality and detailed disclosure, such as explanation of initialization by exchanging “framing parameters . . . between the VTU-O and VTU-R.” G.993.1 at 17. In addition, a person of ordinary skill in the art would have been motivated to combine LB-031 with G.993.1 because (a) LB-031 and G.993.1 are both directed to VDSL transceiver implementation methodologies, *see, .e.g.*, LB-031 at 2 (which explains that it “applies to all interleavers being considered for VDSL2”); (b) G.993.1 was approved by the International Telecommunication Union (ITU) Telecommunication Standardization Sector (ITU-T), and LB-031 came out of Study Group 15 of ITU-T; and (c) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to VDSL transceivers. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.993.1’s teachings

with those of LB-031. For similar reasons, a person of ordinary skill in the art would have been motivated to combine LB-031 with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine LB-031 with Mazzoni for many reasons. First, both LB-031 and Mazzoni describe VDSL transceivers, so a person of ordinary skill in the art would have been motivated to consider them together. For example, LB-031 describes a method of restricting interleaver delay to restrict interleaver memory. LB-031 at 1. Specifically, LB-031 explains that “it seems prudent to define the interleaver complexity requirements in a way that will allow those who want to deploy VDSL2 at lower speeds to do so at a reduced complexity with respect to higher speed implementations.” LB-031 at 3. Likewise, Mazzoni is titled “Device for Sending/Receiving Digital Data Capable of Processing Different Bit Rates, in Particular in a VDSL Environment.” Thus, a person of ordinary skill would have been motivated to modify the method of LB-031 to implement the details of interleaving and memory allocation as described in Mazzoni, such as, for example, providing “a send/receive device (i.e. modem) architecture which requires a reduced quantity of memory.” Mazzoni at 1:47-49. A person of ordinary skill would have been motivated by the advantages of such functionality and would have been motivated to combine the flexible memory structure of Mazzoni and LB-031 to allocate memory. For example, Mazzoni explains that the “memory may have a first memory space assigned to the interleaver and a secondary memory space assigned to the deinterleaver,” and that the “size of each of the two memory spaces may be set as a function of the bit rate actually processed by the device.” Mazzoni at Abstract. In addition, a person of ordinary skill in the art would have been motivated to combine LB-031 with Mazzoni because (a) LB-031 and Mazzoni

are both directed to VDSL transceiver implementation methodologies, *see, .e.g.*, LB-031 at 2 (which explains that it “applies to all interleavers being considered for VDSL2”); Mazzoni at 1:8–15 (“The present invention relates to the field of telecommunications, and, more particularly, to transmitters and receivers for data communication lines.”); (b) Mazzoni is assigned to STMicroelectronics, a leader in the industry that a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to VDSL transceivers. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Mazzoni’s teachings with those of LB-031. For similar reasons, a person of ordinary skill in the art would have been motivated to combine LB-031 with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine LB-031 with Fadavi-Ardekani for many reasons. First, both LB-031 and Fadavi-Ardekani describe allocation of memory in a DSL environment, so a person of ordinary skill in the art would have been motivated to consider them together. For example, LB-031 describes a method of restricting interleaver delay to restrict interleaver memory. LB-031 at 1. Specifically, LB-031 explains that “it seems prudent to define the interleaver complexity requirements in a way that will allow those who want to deploy VDSL2 at lower speeds to do so at a reduced complexity with respect to higher speed implementations.” LB-031 at 3. A person of ordinary skill would have been motivated to modify the method of LB-031 to implement the details of “interleaving” and memory allocation as described in Fadavi-Ardekani, such as, for example, providing “a dual access memory that is used in a ping-pang fashion to transfer unframed bearer channel data between the ATM accelerator

222 and the FCI 226.” Fadavi-Ardekani at 5:57–60. A person of ordinary skill would have been motivated by the advantages of such functionality and would have been motivated to combine the “ping-pang” memory structure of Fadavi-Ardekani and LB-031 to allocate memory. For example, Fadavi-Ardekani explains that the “Interleave/De-Interleave Memory (IDIM) 230 provides a memory through which the FCI 226 interfaces the DSP core 228,” and wherein the “IDIM holds DMT frames of data and may be utilized in a ping-pang fashion.” Fadavi-Ardekani at 6:55–58. In addition, a person of ordinary skill in the art would have been motivated to combine LB-031 with Fadavi-Ardekani because (a) LB-031 and Fadavi-Ardekani are both directed to interleaving in a DSL environment, *see, e.g.*, LB-031 at 2 (which explains that it “applies to all interleavers being considered for VDSL2”); (b) Fadavi-Ardekani is assigned to Agere Systems, a spin off of Lucent Technologies, a leader in the industry that a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to interleaving in a DSL environment. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Fadavi-Ardekani’s teachings with those of LB-031. For similar reasons, a person of ordinary skill in the art would have been motivated to combine LB-031 with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine LB-031 with Stephen for many reasons. First, both LB-031 and Stephen describe interleaving of digital data and memory allocation, including via a turbo encoder that was considered for use in a DSL environment, so a person of ordinary skill in the art would have been motivated to consider them together. For example, LB-031 describes a method of restricting interleaver delay to restrict

interleaver memory. LB-031 at 1. Specifically, LB-031 explains that “it seems prudent to define the interleaver complexity requirements in a way that will allow those who want to deploy VDSL2 at lower speeds to do so at a reduced complexity with respect to higher speed implementations.” LB-031 at 3. A person of ordinary skill would have been motivated to modify the method of LB-031 to implement the details of interleaving and memory allocation as described in Stephen, such as, for example, providing for “[c]onvolutional S-random interleaving[, which] allows for continuous processing, but requires large memory storage for the iterative decoding process.” Stephen at 5:26–29. A person of ordinary skill would have been motivated by the advantages of such functionality and would have been motivated to combine this memory structure of Stephen and LB-031 to allocate memory. For example, Stephen explains that the “the interleaver and de-interleaver can be combined into one unit that shares its RAM.” Stephen at 24:47–48. In addition, a person of ordinary skill in the art would have been motivated to combine LB-031 with Stephen because (a) LB-031 and Stephen are both directed to interleaving and memory allocation, *see, .e.g.*, LB-031 at 2 (which explains that it “applies to all interleavers being considered for VDSL2”); (b) Stephen is assigned to International Business Machines Corporation, a leader in the industry that a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to interleaving in telecommunications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Stephen’s teachings with those of LB-031. For similar reasons, a person of ordinary skill in the art would have been motivated to combine LB-031 with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine LB-031 with Berkmann for many reasons. First, both LB-031 and Berkmann describe memory allocation for interleaving and deinterleaving, so a person of ordinary skill in the art would have been motivated to consider them together. For example, LB-031 describes a method of restricting interleaver delay to restrict interleaver memory. LB-031 at 1. Specifically, LB-031 explains that “it seems prudent to define the interleaver complexity requirements in a way that will allow those who want to deploy VDSL2 at lower speeds to do so at a reduced complexity with respect to higher speed implementations.” LB-031 at 3. A person of ordinary skill would have been motivated to modify the method of LB-031 to implement the details of interleaving and memory allocation as described in Berkmann, such as, for example, providing for a “combined interleaving and deinterleaving circuit,” which “has the advantage that it requires only one memory area for carrying out the two operating modes (interleaving/deinterleaving).” Berkmann at [0015]. A person of ordinary skill would have been motivated by the advantages of such functionality and would have been motivated to combine this memory structure of Berkmann and LB-031 to allocate memory. For example, Berkmann explains that in conventional decoders, the “interleaver and deinterleaver are implemented independently of one another,” which may require a “relatively large amount of computation effort,” and so there is a benefit to the shared memory. Berkmann at [0010]–[0011]. In addition, a person of ordinary skill in the art would have been motivated to combine LB-031 with Berkmann because (a) LB-031 and Berkmann are both directed to interleaving and memory allocation, *see, .e.g.*, LB-031 at 2 (which explains that it “applies to all interleavers being considered for VDSL2”); (b) Berkmann is assigned to Infineon Technologies AG, a leader in the industry that a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both disclosures are analogous art and in the same field of endeavor as each other,

for example, both relate to interleaving in telecommunications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Berkmann's teachings with those of LB-031. For similar reasons, a person of ordinary skill in the art would have been motivated to combine LB-031 with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

(2) Exemplary G.993.1 Solutions

A person of ordinary skill in the art would have been motivated to combine G.993.1 with LB-031 for many reasons. For example, G.993.1 describes the standards for VDSL transceivers. *See* G.993.1 at Title (“Very high speed digital subscriber line transceivers”). Specifically, G.993.1 describes using interleaving “to protect the data against bursts of errors by spreading the errors over a number of Reed-Solomon codewords,” and setting various interleave parameters to define “error correction” and “end-to-end delay.” G.993.1 at 15-16. A person of ordinary skill would have been motivated to modify the method of G.993.1 to implement the method of reducing memory usage by the interleaver/deinterleaver as described by LB-031. *See* LB-031. A person of ordinary skill would have been motivated by the advantages of such functionality and detailed disclosure, such as “defin[ing] the interleaver complexity requirements in a way that will allow those who want to deploy VDSL2 at lower speeds to do so at a reduced complexity with respect to higher speed implementations.” LB-031 at 3. In addition, a person of ordinary skill in the art would have been motivated to combine G.993.1 with LB-031 because (a) G.993.1 and LB-031 are both directed to VDSL transceiver implementation methodologies; (b) G.993.1 was approved by the International Telecommunication Union (ITU) Telecommunication Standardization Sector (ITU-T), and LB-031 came out of Study Group 15 of ITU-T; and (c) both disclosures are analogous art

and in the same field of endeavor as each other, for example, both relate to VDSL transceivers. Moreover, a POSITA would have had a reasonable expectation of success in incorporating LB-031's teachings with those of G.993.1. For similar reasons, a person of ordinary skill in the art would have been motivated to combine G.993.1 with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine G.993.1 with Mazzoni for many reasons. For example, G.993.1 describes the standards for VDSL transceivers. See G.993.1 at Title (“Very high speed digital subscriber line transceivers”). Specifically, G.993.1 describes using interleaving “to protect the data against bursts of errors by spreading the errors over a number of Reed-Solomon codewords,” and setting various interleave parameters to define “error correction” and “end-to-end delay.” G.993.1 at 15-16. Likewise, Mazzoni is titled “Device for Sending/Receiving Digital Data Capable of Processing Different Bit Rates, in Particular in a VDSL Environment.” Thus, a person of ordinary skill would have been motivated to modify the method of G.993.1 to implement the details of interleaving and memory allocation as described in Mazzoni, such as, for example, providing “a send/receive device (i.e. modem) architecture which requires a reduced quantity of memory.” Mazzoni at 1:47-49. A person of ordinary skill would have been motivated by the advantages of such functionality and would have been motivated to combine the flexible memory structure of Mazzoni and G.993.1 to allocate memory. For example, Mazzoni explains that the “memory may have a first memory space assigned to the interleaver and a secondary memory space assigned to the deinterleaver,” and that the “size of each of the two memory spaces may be set as a function of the bit rate actually processed by the device.” Mazzoni at Abstract. In addition, a person of ordinary skill in the art would have been motivated to combine

G.993.1 with Mazzoni because (a) G.993.1 and Mazzoni are both directed to VDSL transceiver implementation methodologies; (b) Mazzoni is assigned to STMicroelectronics, a leader in the industry that a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to VDSL transceivers. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Mazzoni's teachings with those of G.993.1. For similar reasons, a person of ordinary skill in the art would have been motivated to combine G.993.1 with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine G.993.1 with Fadavi-Ardekani for many reasons. For example, G.993.1 describes the standards for VDSL transceivers. *See* G.993.1 at Title (“Very high speed digital subscriber line transceivers”). Specifically, G.993.1 describes using interleaving “to protect the data against bursts of errors by spreading the errors over a number of Reed-Solomon codewords,” and setting various interleave parameters to define “error correction” and “end-to-end delay.” G.993.1 at 15-16. A person of ordinary skill would have been motivated to modify the method of G.993.1 to implement the details of “interleaving” and memory allocation as described in Fadavi-Ardekani, such as, for example, providing “a dual access memory that is used in a ping-pang fashion to transfer unframed bearer channel data between the ATM accelerator 222 and the FCI 226.” Fadavi-Ardekani at 5:57–60. A person of ordinary skill would have been motivated by the advantages of such functionality and would have been motivated to combine the “ping-pang” memory structure of Fadavi-Ardekani and G.993.1 to allocate memory. For example, Fadavi-Ardekani explains that the “Interleave/De-

Interleave Memory (IDIM) 230 provides a memory through which the FCI 226 interfaces the DSP core 228,” and wherein the “IDIM holds DMT frames of data and may be utilized in a ping-pang fashion.” Fadavi-Ardekani at 6:55–58. In addition, a person of ordinary skill in the art would have been motivated to combine G.993.1 with Fadavi-Ardekani because (a) G.993.1 and Fadavi-Ardekani are both directed to interleaving in a DSL environment; (b) Fadavi-Ardekani is assigned to Agere Systems, a spinoff of Lucent Technologies, a leader in the industry that a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to interleaving in a DSL environment. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Fadavi-Ardekani’s teachings with those of G.993.1. For similar reasons, a person of ordinary skill in the art would have been motivated to combine G.993.1 with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine G.993.1 with Stephen for many reasons. For example, G.993.1 describes the standards for VDSL transceivers. See G.993.1 at Title (“Very high speed digital subscriber line transceivers”). Specifically, G.993.1 describes using interleaving “to protect the data against bursts of errors by spreading the errors over a number of Reed-Solomon codewords,” and setting various interleave parameters to define “error correction” and “end-to-end delay.” G.993.1 at 15-16. A person of ordinary skill would have been motivated to modify the method of G.993.1 to implement the details of interleaving and memory allocation as described in Stephen, such as, for example, providing for “[c]onvolutional S-random interleaving[, which] allows for continuous processing, but requires large memory

storage for the iterative decoding process.” Stephen at 5:26–29. A person of ordinary skill would have been motivated by the advantages of such functionality and would have been motivated to combine this memory structure of Stephen and G.993.1 to allocate memory. For example, Stephen explains that the “the interleaver and de-interleaver can be combined into one unit that shares its RAM.” Stephen at 24:47–48. In addition, a person of ordinary skill in the art would have been motivated to combine G.993.1 with Stephen because (a) G.993.1 and Stephen are both directed to interleaving and memory allocation; (b) Stephen is assigned to International Business Machines Corporation, a leader in the industry that a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to interleaving in telecommunications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Stephen’s teachings with those of G.993.1. For similar reasons, a person of ordinary skill in the art would have been motivated to combine G.993.1 with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine G.993.1 with Berkman for many reasons. For example, G.993.1 describes the standards for VDSL transceivers. See G.993.1 at Title (“Very high speed digital subscriber line transceivers”). Specifically, G.993.1 describes using interleaving “to protect the data against bursts of errors by spreading the errors over a number of Reed-Solomon codewords,” and setting various interleave parameters to define “error correction” and “end-to-end delay.” G.993.1 at 15-16. A person of ordinary skill would have been motivated to modify the method of G.993.1 to implement the details of interleaving and memory allocation as described in Berkman, such as, for example, providing for a “combined

interleaving and deinterleaving circuit,” which “has the advantage that it requires only one memory area for carrying out the two operating modes (interleaving/deinterleaving).” Berkmann at [0015]. A person of ordinary skill would have been motivated by the advantages of such functionality and would have been motivated to combine this memory structure of Berkmann and G.993.1 to allocate memory. For example, Berkmann explains that in conventional decoders, the “interleaver and deinterleaver are implemented independently of one another,” which may require a “relatively large amount of computation effort,” and so there is a benefit to the shared memory. Berkmann at [0010]–[0011]. In addition, a person of ordinary skill in the art would have been motivated to combine G.993.1 with Berkmann because (a) G.993.1 and Berkmann are both directed to interleaving and memory allocation; (b) Berkmann is assigned to Infineon Technologies AG, a leader in the industry that a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to interleaving in telecommunications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Berkmann’s teachings with those of G.993.1. For similar reasons, a person of ordinary skill in the art would have been motivated to combine G.993.1 with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

(3) Exemplary Mazzoni Solutions

A person of ordinary skill in the art would have been motivated to combine Mazzoni with LB-031 for many reasons. First, both Mazzoni and LB-031 describe VDSL transceivers, so a person of ordinary skill in the art would have been motivated to consider them together. For example, Mazzoni describes “a send/receive device (i.e. modem) architecture which requires a

reduced quantity of memory.” Mazzoni at 1:47-49. Mazzoni explains that the “memory may have a first memory space assigned to the interleaver and a secondary memory space assigned to the deinterleaver,” and that the “size of each of the two memory spaces may be set as a function of the bit rate actually processed by the device.” Mazzoni at Abstract. Thus, a person of ordinary skill would have been motivated to modify the method of Mazzoni to implement the method of reducing memory usage by the interleaver/deinterleaver as described by LB-031. *See* LB-031. A person of ordinary skill would have been motivated by the advantages of such functionality and detailed disclosure, such as “defin[ing] the interleaver complexity requirements in a way that will allow those who want to deploy VDSL2 at lower speeds to do so at a reduced complexity with respect to higher speed implementations.” LB-031 at 3. In addition, a person of ordinary skill in the art would have been motivated to combine Mazzoni with LB-031 because (a) Mazzoni and LB-031 are both directed to VDSL transceiver implementation methodologies, *see, .e.g.*, LB-031 at 2 (which explains that it “applies to all interleavers being considered for VDSL2”); Mazzoni at 1:8–15 (“The present invention relates to the field of telecommunications, and, more particularly, to transmitters and receivers for data communication lines.”); (b) LB-031 came out of Study Group 15 of ITU-T, a group of the International Telecommunication Union, a group which a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to VDSL transceivers. Moreover, a POSITA would have had a reasonable expectation of success in incorporating LB-031’s teachings with those of Mazzoni. For similar reasons, a person of ordinary skill in the art would have been motivated to combine Mazzoni with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F

and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine Mazzoni with G.993.1 for many reasons. First, both Mazzoni and G.993.1 describe methodologies for improving VDSL transceivers, so a person of ordinary skill in the art would have been motivated to consider them together. For example, Mazzoni describes “a send/receive device (i.e. modem) architecture which requires a reduced quantity of memory.” Mazzoni at 1:47-49. Mazzoni explains that the “memory may have a first memory space assigned to the interleaver and a secondary memory space assigned to the deinterleaver,” and that the “size of each of the two memory spaces may be set as a function of the bit rate actually processed by the device.” Mazzoni at Abstract. A person of ordinary skill would have been motivated to modify the method of Mazzoni to implement the details of “interleaving” as described in G.993.1, such as, for example, using interleaving “to protect the data against bursts of errors by spreading the errors over a number of Reed-Solomon codewords,” and setting various interleave parameters to define “error correction” and “end-to-end delay.” G.993.1 at 15-16. A person of ordinary skill would have been motivated by the advantages of such functionality and detailed disclosure, such as explanation of initialization by exchanging “framing parameters . . . between the VTU-O and VTU-R.” G.993.1 at 17. In addition, a person of ordinary skill in the art would have been motivated to combine Mazzoni with G.993.1 because (a) Mazzoni and G.993.1 are both directed to VDSL transceiver implementation methodologies, indeed Mazzoni expressly references VDSL and G.993.1 is the standard for VDSL; (b) G.993.1 was approved by the International Telecommunication Union (ITU) Telecommunication Standardization Sector (ITU-T), and Mazzoni “relates to the field of telecommunications,” Mazzoni at 1:8–10; and (c) both disclosures are analogous art and in the

same field of endeavor as each other, for example, both relate to VDSL transceivers. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.993.1's teachings with those of Mazzoni. For similar reasons, a person of ordinary skill in the art would have been motivated to combine Mazzoni with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine Mazzoni with Fadavi-Ardekani for many reasons. For example, Mazzoni describes “a send/receive device (i.e. modem) architecture which requires a reduced quantity of memory.” Mazzoni at 1:47-49. Mazzoni explains that the “memory may have a first memory space assigned to the interleaver and a secondary memory space assigned to the deinterleaver,” and that the “size of each of the two memory spaces may be set as a function of the bit rate actually processed by the device.” Mazzoni at Abstract. A person of ordinary skill would have been motivated to modify the method of Mazzoni to implement the additional details of interleaving and memory allocation as described in Fadavi-Ardekani, such as, for example, providing “a dual access memory that is used in a ping-pang fashion to transfer unframed bearer channel data between the ATM accelerator 222 and the FCI 226.” Fadavi-Ardekani at 5:57–60. A person of ordinary skill would have been motivated by the advantages of such functionality and would have been motivated to combine the “ping-pang” memory structure of Fadavi-Ardekani and Mazzoni to allocate memory. For example, Fadavi-Ardekani explains that the “Interleave/De-Interleave Memory (IDIM) 230 provides a memory through which the FCI 226 interfaces the DSP core 228,” and wherein the “IDIM holds DMT frames of data and may be utilized in a ping-pang fashion.” Fadavi-Ardekani at 6:55–58. In addition, a person of ordinary skill in the art would have been motivated to combine Mazzoni with

Fadavi-Ardekani because (a) Mazzoni and Fadavi-Ardekani are both directed to interleaving in a DSL environment; (b) Fadavi-Ardekani is assigned to Agere Systems, a spinoff of Lucent Technologies, a leader in the industry that a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to interleaving in a DSL environment. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Fadavi-Ardekani's teachings with those of Mazzoni. For similar reasons, a person of ordinary skill in the art would have been motivated to combine Mazzoni with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine Mazzoni with Stephen for many reasons. For example, Mazzoni describes “a send/receive device (i.e. modem) architecture which requires a reduced quantity of memory.” Mazzoni at 1:47-49. Mazzoni explains that the “memory may have a first memory space assigned to the interleaver and a secondary memory space assigned to the deinterleaver,” and that the “size of each of the two memory spaces may be set as a function of the bit rate actually processed by the device.” Mazzoni at Abstract. A person of ordinary skill would have been motivated to modify the method of Mazzoni to implement the details of interleaving and memory allocation as described in Stephen, such as, for example, providing for “[c]onvolutional S-random interleaving[, which] allows for continuous processing, but requires large memory storage for the iterative decoding process.” Stephen at 5:26–29. A person of ordinary skill would have been motivated by the advantages of such functionality and would have been motivated to combine this memory structure of Stephen and Mazzoni to allocate memory. For example, Stephen explains that the “the interleaver and de-interleaver can be

combined into one unit that shares its RAM.” Stephen at 24:47–48. In addition, a person of ordinary skill in the art would have been motivated to combine Mazzoni with Stephen because (a) Mazzoni and Stephen are both directed to interleaving and memory allocation; (b) Stephen is assigned to International Business Machines Corporation, a leader in the industry that a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to interleaving in telecommunications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Stephen’s teachings with those of Mazzoni. For similar reasons, a person of ordinary skill in the art would have been motivated to combine Mazzoni with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine Mazzoni with Berkman for many reasons. For example, Mazzoni describes “a send/receive device (i.e. modem) architecture which requires a reduced quantity of memory.” Mazzoni at 1:47-49. Mazzoni explains that the “memory may have a first memory space assigned to the interleaver and a secondary memory space assigned to the deinterleaver,” and that the “size of each of the two memory spaces may be set as a function of the bit rate actually processed by the device.” Mazzoni at Abstract. A person of ordinary skill would have been motivated to modify the method of Mazzoni to implement the details of interleaving and memory allocation as described in Berkman, such as, for example, providing for a “combined interleaving and deinterleaving circuit,” which “has the advantage that it requires only one memory area for carrying out the two operating modes (interleaving/deinterleaving).” Berkman at [0015]. A person of ordinary skill would have been

motivated by the advantages of such functionality and would have been motivated to combine this memory structure of Berkmann and Mazzoni to allocate memory. For example, Berkmann explains that in conventional decoders, the “interleaver and deinterleaver are implemented independently of one another,” which may require a “relatively large amount of computation effort,” and so there is a benefit to the shared memory. Berkmann at [0010]–[0011]. In addition, a person of ordinary skill in the art would have been motivated to combine Mazzoni with Berkmann because (a) Mazzoni and Berkmann are both directed to interleaving and memory allocation; (b) Berkmann is assigned to Infineon Technologies AG, a leader in the industry that a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to interleaving in telecommunications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Berkmann’s teachings with those of Mazzoni. For similar reasons, a person of ordinary skill in the art would have been motivated to combine Mazzoni with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

(4) Example Fadavi-Ardekani Solutions

A person of ordinary skill in the art would have been motivated to combine Fadavi-Ardekani with LB-031 for many reasons. For example, Fadavi-Ardekani describes “a dual access memory that is used in a ping-pang fashion to transfer unframed bearer channel data between the ATM accelerator 222 and the FCI 226.” Fadavi-Ardekani at 5:57–60. Fadavi-Ardekani explains that the “Interleave/De-Interleave Memory (IDIM) 230 provides a memory through which the FCI 226 interfaces the DSP core 228,” and wherein the “IDIM holds DMT frames of data and may be

utilized in a ping-pang fashion.” Fadavi-Ardekani at 6:55–58. Thus, a person of ordinary skill would have been motivated to modify the method of Fadavi-Ardekani to implement the method of reducing memory usage by the interleaver/deinterleaver as described by LB-031. *See* LB-031. A person of ordinary skill would have been motivated by the advantages of such functionality and detailed disclosure, such as “defin[ing] the interleaver complexity requirements in a way that will allow those who want to deploy VDSL2 at lower speeds to do so at a reduced complexity with respect to higher speed implementations.” LB-031 at 3. In addition, a person of ordinary skill in the art would have been motivated to combine Fadavi-Ardekani with LB-031 because (a) Fadavi-Ardekani and LB-031 are both directed to interleaving in a DSL environment; (b) LB-031 came out of Study Group 15 of ITU-T, a group of the International Telecommunication Union, a group which a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to interleaving in a DSL environment. Moreover, a POSITA would have had a reasonable expectation of success in incorporating LB-031’s teachings with those of Fadavi-Ardekani. For similar reasons, a person of ordinary skill in the art would have been motivated to combine Fadavi-Ardekani with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine Fadavi-Ardekani with G.993.1 for many reasons. For example, Fadavi-Ardekani describes “a dual access memory that is used in a ping-pang fashion to transfer unframed bearer channel data between the ATM accelerator 222 and the FCI 226.” Fadavi-Ardekani at 5:57–60. Fadavi-Ardekani explains that the “Interleave/De-Interleave Memory (IDIM) 230 provides a memory through which the FCI

226 interfaces the DSP core 228,” and wherein the “IDIM holds DMT frames of data and may be utilized in a ping-pang fashion.” Fadavi-Ardekani at 6:55–58. Thus, a person of ordinary skill would have been motivated to modify the method of Fadavi-Ardekani to implement the details of “interleaving” as described in G.993.1, such as, for example, using interleaving “to protect the data against bursts of errors by spreading the errors over a number of Reed-Solomon codewords,” and setting various interleave parameters to define “error correction” and “end-to-end delay.” G.993.1 at 15-16. A person of ordinary skill would have been motivated by the advantages of such functionality and detailed disclosure, such as explanation of initialization by exchanging “framing parameters . . . between the VTU-O and VTU-R.” G.993.1 at 17. In addition, a person of ordinary skill in the art would have been motivated to combine Fadavi-Ardekani with G.993.1 because (a) Fadavi-Ardekani and G.993.1 are both directed to transceivers in a DSL environment; (b) G.993.1 was approved by the International Telecommunication Union (ITU) Telecommunication Standardization Sector (ITU-T), and Fadavi-Ardekani relates to the field of telecommunications; and (c) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to transceivers in a DSL environment. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.993.1’s teachings with those of Fadavi-Ardekani. For similar reasons, a person of ordinary skill in the art would have been motivated to combine Fadavi-Ardekani with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine Fadavi-Ardekani with Mazzoni for many reasons. For example, Fadavi-Ardekani describes “a dual access memory that is used in a ping-pang fashion to transfer unframed bearer channel data between the

ATM accelerator 222 and the FCI 226.” Fadavi-Ardekani at 5:57–60. Fadavi-Ardekani explains that the “Interleave/De-Interleave Memory (IDIM) 230 provides a memory through which the FCI 226 interfaces the DSP core 228,” and wherein the “IDIM holds DMT frames of data and may be utilized in a ping-pang fashion.” Fadavi-Ardekani at 6:55–58. Thus, a person of ordinary skill would have been motivated to modify the method of Fadavi-Ardekani to implement the details of interleaving and memory allocation as described in Mazzoni, such as, for example, providing “a send/receive device (i.e. modem) architecture which requires a reduced quantity of memory.” Mazzoni at 1:47-49. A person of ordinary skill would have been motivated by the advantages of such functionality and would have been motivated to combine the flexible memory structure of Mazzoni and Fadavi-Ardekani to allocate memory. For example, Mazzoni explains that the “memory may have a first memory space assigned to the interleaver and a secondary memory space assigned to the deinterleaver,” and that the “size of each of the two memory spaces may be set as a function of the bit rate actually processed by the device.” Mazzoni at Abstract. In addition, a person of ordinary skill in the art would have been motivated to combine Fadavi-Ardekani with Mazzoni because (a) Fadavi-Ardekani and Mazzoni are both directed to interleaving in a DSL environment; (b) Mazzoni is assigned to STMicroelectronics, a leader in the industry that a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to transceivers in a DSL environment. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Mazzoni’s teachings with those of Fadavi-Ardekani. For similar reasons, a person of ordinary skill in the art would have been motivated to combine Fadavi-Ardekani with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A

– F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine Fadavi-Ardekani with Stephen for many reasons. For example, Fadavi-Ardekani describes “a dual access memory that is used in a ping-pang fashion to transfer unframed bearer channel data between the ATM accelerator 222 and the FCI 226.” Fadavi-Ardekani at 5:57–60. Fadavi-Ardekani explains that the “Interleave/De-Interleave Memory (IDIM) 230 provides a memory through which the FCI 226 interfaces the DSP core 228,” and wherein the “IDIM holds DMT frames of data and may be utilized in a ping-pang fashion.” Fadavi-Ardekani at 6:55–58. Thus, a person of ordinary skill would have been motivated to modify the method of Fadavi-Ardekani to implement the details of interleaving and memory allocation as described in Stephen, such as, for example, providing for “[c]onvolutional S-random interleaving[, which] allows for continuous processing, but requires large memory storage for the iterative decoding process.” Stephen at 5:26–29. A person of ordinary skill would have been motivated by the advantages of such functionality and would have been motivated to combine this memory structure of Stephen and Fadavi-Ardekani to allocate memory. For example, Stephen explains that the “the interleaver and de-interleaver can be combined into one unit that shares its RAM.” Stephen at 24:47–48. In addition, a person of ordinary skill in the art would have been motivated to combine Fadavi-Ardekani with Stephen because (a) Fadavi-Ardekani and Stephen are both directed to interleaving and memory allocation; (b) Stephen is assigned to International Business Machines Corporation, a leader in the industry that a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to interleaving in telecommunications. Moreover, a POSITA would have had a reasonable

expectation of success in incorporating Stephen's teachings with those of Fadavi-Ardekani. For similar reasons, a person of ordinary skill in the art would have been motivated to combine Fadavi-Ardekani with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine Fadavi-Ardekani with Berkmann for many reasons. For example, Fadavi-Ardekani describes “a dual access memory that is used in a ping-pang fashion to transfer unframed bearer channel data between the ATM accelerator 222 and the FCI 226.” Fadavi-Ardekani at 5:57–60. Fadavi-Ardekani explains that the “Interleave/De-Interleave Memory (IDIM) 230 provides a memory through which the FCI 226 interfaces the DSP core 228,” and wherein the “IDIM holds DMT frames of data and may be utilized in a ping-pang fashion.” Fadavi-Ardekani at 6:55–58. Thus, a person of ordinary skill would have been motivated to modify the method of Fadavi-Ardekani to implement the details of interleaving and memory allocation as described in Berkmann, such as, for example, providing for a “combined interleaving and deinterleaving circuit,” which “has the advantage that it requires only one memory area for carrying out the two operating modes (interleaving/deinterleaving).” Berkmann at [0015]. A person of ordinary skill would have been motivated by the advantages of such functionality and would have been motivated to combine this memory structure of Berkmann and Fadavi-Ardekani to allocate memory. For example, Berkmann explains that in conventional decoders, the “interleaver and deinterleaver are implemented independently of one another,” which may require a “relatively large amount of computation effort,” and so there is a benefit to the shared memory. Berkmann at [0010]–[0011]. In addition, a person of ordinary skill in the art would have been motivated to combine Fadavi-Ardekani with

Berkmann because (a) Fadavi-Ardekani and Berkmann are both directed to interleaving and memory allocation; (b) Berkmann is assigned to Infineon Technologies AG, a leader in the industry that a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to interleaving in telecommunications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Berkmann's teachings with those of Fadavi-Ardekani. For similar reasons, a person of ordinary skill in the art would have been motivated to combine Mazzoni with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

(5) Exemplary Stephen Solutions

A person of ordinary skill in the art would have been motivated to combine Stephen with LB-031 for many reasons. For example, Stephen describes “[c]onvolutional S-random interleaving[, which] allows for continuous processing, but requires large memory storage for the iterative decoding process.” Stephen at 5:26–29. Stephen explains that the “the interleaver and deinterleaver can be combined into one unit that shares its RAM.” Stephen at 24:47–48. Thus, a person of ordinary skill would have been motivated to modify the method of Stephen to implement the method of reducing memory usage by the interleaver/deinterleaver as described by LB-031. See LB-031. A person of ordinary skill would have been motivated by the advantages of such functionality and detailed disclosure, such as “defin[ing] the interleaver complexity requirements in a way that will allow those who want to deploy VDSL2 at lower speeds to do so at a reduced complexity with respect to higher speed implementations.” LB-031 at 3. In addition, a person of ordinary skill in the art would have been motivated to combine Stephen with LB-031 because (a)

Stephen and LB-031 are both directed to interleaving and memory allocation; (b) LB-031 came out of Study Group 15 of ITU-T, a group of the International Telecommunication Union, a group which a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to interleaving in telecommunications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating LB-031's teachings with those of Stephen. For similar reasons, a person of ordinary skill in the art would have been motivated to combine Stephen with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine Stephen with G.993.1 for many reasons. For example, Stephen describes “[c]onvolutional S-random interleaving[, which] allows for continuous processing, but requires large memory storage for the iterative decoding process.” Stephen at 5:26–29. Stephen explains that the “the interleaver and de-interleaver can be combined into one unit that shares its RAM.” Stephen at 24:47–48. Thus, a person of ordinary skill would have been motivated to modify the method of Stephen to implement the details of “interleaving” as described in G.993.1, such as, for example, using interleaving “to protect the data against bursts of errors by spreading the errors over a number of Reed-Solomon codewords,” and setting various interleave parameters to define “error correction” and “end-to-end delay.” G.993.1 at 15-16. A person of ordinary skill would have been motivated by the advantages of such functionality and detailed disclosure, such as explanation of initialization by exchanging “framing parameters . . . between the VTU-O and VTU-R.” G.993.1 at 17. In addition, a person of ordinary skill in the art would have been motivated to combine Stephen with G.993.1

because (a) Stephen and G.993.1 are both directed to interleaving and memory allocation; (b) G.993.1 was approved by the International Telecommunication Union (ITU) Telecommunication Standardization Sector (ITU-T), and Stephen relates to the field of telecommunications; and (c) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to interleaving in telecommunications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.993.1's teachings with those of Stephen. For similar reasons, a person of ordinary skill in the art would have been motivated to combine Stephen with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine Stephen with Mazzoni for many reasons. For example, Stephen describes “[c]onvolutional S-random interleaving[, which] allows for continuous processing, but requires large memory storage for the iterative decoding process.” Stephen at 5:26–29. Stephen explains that the “the interleaver and deinterleaver can be combined into one unit that shares its RAM.” Stephen at 24:47–48. Thus, a person of ordinary skill would have been motivated to modify the method of Stephen to implement the details of interleaving and memory allocation as described in Mazzoni, such as, for example, providing “a send/receive device (i.e. modem) architecture which requires a reduced quantity of memory.” Mazzoni at 1:47-49. A person of ordinary skill would have been motivated by the advantages of such functionality and would have been motivated to combine the flexible memory structure of Mazzoni and Stephen to allocate memory. For example, Mazzoni explains that the “memory may have a first memory space assigned to the interleaver and a secondary memory space assigned to the deinterleaver,” and that the “size of each of the two memory spaces may be

set as a function of the bit rate actually processed by the device.” Mazzoni at Abstract. In addition, a person of ordinary skill in the art would have been motivated to combine Stephen with Mazzoni because (a) Stephen and Mazzoni are both directed to interleaving and memory allocation; (b) Mazzoni is assigned to STMicroelectronics, a leader in the industry that a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to interleaving and memory allocation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Mazzoni’s teachings with those of Stephen. For similar reasons, a person of ordinary skill in the art would have been motivated to combine Stephen with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine Stephen with Fardavi-Ardekani for many reasons. For example, Stephen describes “[c]onvolutional S-random interleaving[, which] allows for continuous processing, but requires large memory storage for the iterative decoding process.” Stephen at 5:26–29. Stephen explains that the “the interleaver and de-interleaver can be combined into one unit that shares its RAM.” Stephen at 24:47–48. Thus, a person of ordinary skill would have been motivated to modify the method of Stephen to implement the additional details of interleaving and memory allocation as described in Fadavi-Ardekani, such as, for example, providing “a dual access memory that is used in a ping-pang fashion to transfer unframed bearer channel data between the ATM accelerator 222 and the FCI 226.” Fadavi-Ardekani at 5:57–60. A person of ordinary skill would have been motivated by the advantages of such functionality and would have been motivated to combine the “ping-pang” memory structure

of Fadavi-Ardekani and Stephen to allocate memory. For example, Fadavi-Ardekani explains that the “Interleave/De-Interleave Memory (IDIM) 230 provides a memory through which the FCI 226 interfaces the DSP core 228,” and wherein the “IDIM holds DMT frames of data and may be utilized in a ping-pang fashion.” Fadavi-Ardekani at 6:55–58. In addition, a person of ordinary skill in the art would have been motivated to combine Stephen with Fadavi-Ardekani because (a) Stephen and Fadavi-Ardekani are both directed to interleaving and memory allocation; (b) Fadavi-Ardekani is assigned to Agere Systems, a spinoff of Lucent Technologies, a leader in the industry that a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to interleaving in telecommunications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Fadavi-Ardekani’s teachings with those of Stephen. For similar reasons, a person of ordinary skill in the art would have been motivated to combine Stephen with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine Stephen with Berkmann for many reasons. For example, Stephen describes “[c]onvolutional S-random interleaving[, which] allows for continuous processing, but requires large memory storage for the iterative decoding process.” Stephen at 5:26–29. Stephen explains that the “the interleaver and de-interleaver can be combined into one unit that shares its RAM.” Stephen at 24:47–48. Thus, a person of ordinary skill would have been motivated to modify the method of Stephen to implement the details of interleaving and memory allocation as described in Berkmann, such as, for example, providing for a “combined interleaving and deinterleaving circuit,” which “has the advantage that

it requires only one memory area for carrying out the two operating modes (interleaving/deinterleaving).” Berkmann at [0015]. A person of ordinary skill would have been motivated by the advantages of such functionality and would have been motivated to combine this memory structure of Berkmann and Stephen to allocate memory. For example, Berkmann explains that in conventional decoders, the “interleaver and deinterleaver are implemented independently of one another,” which may require a “relatively large amount of computation effort,” and so there is a benefit to the shared memory. Berkmann at [0010]–[0011]. In addition, a person of ordinary skill in the art would have been motivated to combine Stephen with Berkmann because (a) Stephen and Berkmann are both directed to interleaving and memory allocation; (b) Berkmann is assigned to Infineon Technologies AG, a leader in the industry that a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to interleaving in telecommunications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Berkmann’s teachings with those of Fadavi-Ardekani. For similar reasons, a person of ordinary skill in the art would have been motivated to combine Mazzoni with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

(6) Exemplary Berkmann Solutions

A person of ordinary skill in the art would have been motivated to combine Berkmann with LB-031 for many reasons. For example, Berkmann describes providing for a “combined interleaving and deinterleaving circuit,” which “has the advantage that it requires only one memory area for carrying out the two operating modes (interleaving/deinterleaving).” Berkmann at [0015].

Berkmann explains that in conventional decoders, the “interleaver and deinterleaver are implemented independently of one another,” which may require a “relatively large amount of computation effort,” and so there is a benefit to the shared memory. Berkmann at [0010]–[0011]. Thus, a person of ordinary skill would have been motivated to modify the method of Berkmann to implement the method of reducing memory usage by the interleaver/deinterleaver as described by LB-031. *See* LB-031. A person of ordinary skill would have been motivated by the advantages of such functionality and detailed disclosure, such as “defin[ing] the interleaver complexity requirements in a way that will allow those who want to deploy VDSL2 at lower speeds to do so at a reduced complexity with respect to higher speed implementations.” LB-031 at 3. In addition, a person of ordinary skill in the art would have been motivated to combine Berkmann with LB-031 because (a) Berkmann and LB-031 are both directed to interleaving and memory allocation; (b) LB-031 came out of Study Group 15 of ITU-T, a group of the International Telecommunication Union, a group which a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to interleaving in telecommunications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating LB-031’s teachings with those of Berkmann. For similar reasons, a person of ordinary skill in the art would have been motivated to combine Berkmann with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine Berkmann with G.993.1 for many reasons. For example, Berkmann describes providing for a “combined interleaving and deinterleaving circuit,” which “has the advantage that it requires only one memory

area for carrying out the two operating modes (interleaving/deinterleaving).” Berkmann at [0015]. Berkmann explains that in conventional decoders, the “interleaver and deinterleaver are implemented independently of one another,” which may require a “relatively large amount of computation effort,” and so there is a benefit to the shared memory. Berkmann at [0010]–[0011]. Thus, a person of ordinary skill would have been motivated to modify the method of Berkmann to implement the details of “interleaving” as described in G.993.1, such as, for example, using interleaving “to protect the data against bursts of errors by spreading the errors over a number of Reed-Solomon codewords,” and setting various interleave parameters to define “error correction” and “end-to-end delay.” G.993.1 at 15-16. A person of ordinary skill would have been motivated by the advantages of such functionality and detailed disclosure, such as explanation of initialization by exchanging “framing parameters . . . between the VTU-O and VTU-R.” G.993.1 at 17. In addition, a person of ordinary skill in the art would have been motivated to combine Berkmann with G.993.1 because (a) Berkmann and G.993.1 are both directed to interleaving and memory allocation; (b) G.993.1 was approved by the International Telecommunication Union (ITU) Telecommunication Standardization Sector (ITU-T), and Berkmann relates to the field of telecommunications; and (c) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to interleaving in telecommunications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.993.1’s teachings with those of Berkmann. For similar reasons, a person of ordinary skill in the art would have been motivated to combine Berkmann with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine Berkmann with Mazzoni for many reasons. For example, Berkmann describes providing for a “combined interleaving and deinterleaving circuit,” which “has the advantage that it requires only one memory area for carrying out the two operating modes (interleaving/deinterleaving).” Berkmann at [0015]. Berkmann explains that in conventional decoders, the “interleaver and deinterleaver are implemented independently of one another,” which may require a “relatively large amount of computation effort,” and so there is a benefit to the shared memory. Berkmann at [0010]–[0011]. Thus, a person of ordinary skill would have been motivated to modify the method of Berkmann to implement the details of interleaving and memory allocation as described in Mazzoni, such as, for example, providing “a send/receive device (i.e. modem) architecture which requires a reduced quantity of memory.” Mazzoni at 1:47-49. A person of ordinary skill would have been motivated by the advantages of such functionality and would have been motivated to combine the flexible memory structure of Mazzoni and Berkmann to allocate memory. For example, Mazzoni explains that the “memory may have a first memory space assigned to the interleaver and a secondary memory space assigned to the deinterleaver,” and that the “size of each of the two memory spaces may be set as a function of the bit rate actually processed by the device.” Mazzoni at Abstract. In addition, a person of ordinary skill in the art would have been motivated to combine Berkmann with Mazzoni because (a) Berkmann and Mazzoni are both directed to interleaving and memory allocation; (b) Mazzoni is assigned to STMicroelectronics, a leader in the industry that a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to interleaving and memory allocation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Mazzoni’s teachings with those of Berkmann. For similar

reasons, a person of ordinary skill in the art would have been motivated to combine Berkmann with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine Berkmann with Fadavi-Ardekani for many reasons. For example, Berkmann describes providing for a “combined interleaving and deinterleaving circuit,” which “has the advantage that it requires only one memory area for carrying out the two operating modes (interleaving/deinterleaving).” Berkmann at [0015]. Berkmann explains that in conventional decoders, the “interleaver and deinterleaver are implemented independently of one another,” which may require a “relatively large amount of computation effort,” and so there is a benefit to the shared memory. Berkmann at [0010]–[0011]. Thus, a person of ordinary skill would have been motivated to modify the method of Berkmann to implement the additional details of interleaving and memory allocation as described in Fadavi-Ardekani, such as, for example, providing “a dual access memory that is used in a ping-pang fashion to transfer unframed bearer channel data between the ATM accelerator 222 and the FCI 226.” Fadavi-Ardekani at 5:57–60. A person of ordinary skill would have been motivated by the advantages of such functionality and would have been motivated to combine the “ping-pang” memory structure of Fadavi-Ardekani and Berkmann to allocate memory. For example, Fadavi-Ardekani explains that the “Interleave/De-Interleave Memory (IDIM) 230 provides a memory through which the FCI 226 interfaces the DSP core 228,” and wherein the “IDIM holds DMT frames of data and may be utilized in a ping-pang fashion.” Fadavi-Ardekani at 6:55–58. In addition, a person of ordinary skill in the art would have been motivated to combine Berkmann with Fadavi-Ardekani because (a) Berkmann and Fadavi-Ardekani are both directed to

interleaving and memory allocation; (b) Fadavi-Ardekani is assigned to Agere Systems, a spinoff of Lucent Technologies, a leader in the industry that a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to interleaving in telecommunications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Fadavi-Ardekani's teachings with those of Berkmann. For similar reasons, a person of ordinary skill in the art would have been motivated to combine Berkmann with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine Berkmann with Stephen for many reasons. For example, Berkmann describes providing for a “combined interleaving and deinterleaving circuit,” which “has the advantage that it requires only one memory area for carrying out the two operating modes (interleaving/deinterleaving).” Berkmann at [0015]. Berkmann explains that in conventional decoders, the “interleaver and deinterleaver are implemented independently of one another,” which may require a “relatively large amount of computation effort,” and so there is a benefit to the shared memory. Berkmann at [0010]–[0011]. Thus, a person of ordinary skill would have been motivated to modify the method of Berkmann to implement the details of interleaving and memory allocation as described in Stephen, such as, for example, providing for “[c]onvolutional S-random interleaving[, which] allows for continuous processing, but requires large memory storage for the iterative decoding process.” Stephen at 5:26–29. A person of ordinary skill would have been motivated by the advantages of such functionality and would have been motivated to combine this memory structure of Stephen and Berkmann to

allocate memory. For example, Stephen explains that the “the interleaver and de-interleaver can be combined into one unit that shares its RAM.” Stephen at 24:47–48. In addition, a person of ordinary skill in the art would have been motivated to combine Berkmann with Stephen because (a) Berkmann and Stephen are both directed to interleaving and memory allocation; (b) Stephen is assigned to International Business Machines Corporation, a leader in the industry that a person of ordinary skill in the art would look to when seeking to improve existing products; and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to interleaving in telecommunications. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Stephen’s teachings with those of Berkmann. For similar reasons, a person of ordinary skill in the art would have been motivated to combine Berkmann with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

(7) Exemplary Obviousness References Solutions

A person of ordinary skill in the art would have been motivated to combine LB-031, G.993.1, Mazzoni, Fadavi-Ardekani, Stephen, and Berkmann (the “Primary References”) with the Secondary References for many reasons. As described above, each of the primary references all teach methods or devices that improve DSL technology by improving memory allocation in interleaving. *See* Sections IV.B.3.c)(1)-(7). A person of ordinary skill in the art would have been motivated to modify the method of the Primary References to implement the details of the Secondary References because they are also directed at methods of improving efficiency in the transmission of data through interleaving and allocation of memory.

For example, G.992.2, an ITU standard for ADSL, discloses interleaving using a convolutional interleaver, wherein the output bytes are dependent on the interleaving depth. G.992.2 at 18–19. A person of ordinary skill in the art would have been motivated by the advantages of such functionality, as well as by functionality such as requiring that transceivers must be initialized “in order for a physically connected ATU-R and ATU-C pair to establish a communications link.” *Id.* at 50. Likewise, G.992.1 discloses interleaving and initialization parameters. G.992.1 at 38–39. As another example, a person of ordinary skill in the art would have been motivated to combine the Primary References with the Secondary References based on the advantage of providing “an adaptable, programmable convolutional interleaving and de-interleaving system which uses less integrated circuit space than prior art techniques,” Khoury at 3:23–26, by, for example, “relying on a single port memory,” Khoury at 8:57–9:12. As another example, a person of ordinary skill in the art would have been motivated by the advantages of such functionality, such as exchanging “[t]he rule for data sorting (parameter for depth for interleave, and the like) . . . during the [] initialization sequence.” Suzuki at 6:18–20. Moreover, Suzuki discloses sharing an interleaver memory with a processor, which further supports the motivation to combine. *See, e.g.*, Suzuki at 4:4–13.

As another example, a person of ordinary skill in the art would have been motivated by the advantages of such functionality, such as providing “a DMT transceiver that can support multiple applications and that can dynamically change the transmission and reception of data as a set of active applications changes,” Tzannes at 2:49–52, wherein “[e]ach application in a set of currently active applications is associated with a different Framer/Coder/Interleaver block for processing bits associated with that application,” Tzannes at 2:55–57. As another example, a person of ordinary skill in the art would have been motivated by the advantages of such functionality, such

as, during an initialization sequence, determining “the line characteristics, e.g., line attenuation and SNR, to find out the current maximum supported data rate on the DSL line.” Remy at 4:40–44. A person of ordinary skill in the art would have recognized that such initialization practices is critical to memory allocation, and so would have been motivated to combine with the Primary References.

As another example, a person of ordinary skill in the art would have been motivated by the advantages of such functionality, such as, “in a VDSL system,” “a method for determining a CP sample length in the VDSL system on the DMT line coding method basis compris[ing]: (a) the controller transmitting the maximum length of the CP sample through the transmitter; (b) the CP sample length estimator receiving data including the CP of the transmitted maximum length through the receiver; (c) the CP sample length estimator estimating the optimized length of the CP sample on the basis of a correlation status between the CP sample included in the received data and residual data, and transmitting the estimated optimized length to the controller; and (d) the controller transmitting the estimated optimized length of the CP sample through the transmitter.” Moon at 3:9–30. As another example, a person of ordinary skill in the art would have been motivated by the advantages of such functionality, such as “input parameters designating a framing mode, a maximum interleave depth, a maximum number of error correction check bytes, a latency path, a maximum allowed delay for communications between transceivers in the multicarrier communication system, and a number of subchannel carriers in the discrete multitone symbol carrying bits are received.” Yong at [0020]. As another example, a person of ordinary skill in the art would have been motivated by the advantages of such functionality, such as, in a DSL environment, transmitting information, including “information such as capacity and uplink/downlink transmission speed.” Noma at [0011]. As another example, a person of ordinary

skill in the art would have been motivated by the advantages of such functionality, such as generating “an initial profile of the channel or transmission medium,” wherein that “initial profile includes bits and gains (B&G) tables, FEC parameters R (redundant check bytes) and S (number of symbols per R-S codeword) values, the interleaver depth (D), and the power spectral density (PSD) level.” Hamdi at 12:27–35. Furthermore, a person of ordinary skill in the art would have been motivated to combine by the advantages disclosed in Yonge, namely that packet transmission parameters “may be frequently updated for changing channel conditions.” Yonge at 15.

In addition, a person of ordinary skill in the art would have been motivated to combine any Primary Reference with and Secondary reference because (a) each reference discloses similar products, such as methods used in providing DSL to subscribers at increased speed and efficiency relying on memory allocation and interleaving and (b) the references are analogous art and in the same field of endeavor as each other, for example, both relate to data communications in a DSL environment. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the Secondary References’ teachings with those of the Primary References. For similar reasons, a person of ordinary skill in the art would be motivated to combine the Primary References with other references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 with similar teachings.

d) The Claims Recite Well-Known Concepts That Would Have Been Obvious to Implement.

The Asserted Claims represent nothing more than an arrangement of well-known concepts and features, and add nothing to the state of the art at the time of the alleged invention. For each of the concepts represented by the Asserted Claims, it would have been obvious to add to the teachings of any number of known products and references, including to the teachings of any of

the primary references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 to the extent that such reference is alleged to be missing such concept or feature. The following are examples of concepts that would have been obvious, which is not intended to be an exhaustive list of the claimed features that would have been obvious. Nokia Defendants reserve the right to supplement these examples as necessary.

- (1) It would have been obvious to modify any primary reference for “transmitting or receiving a message during initialization specifying a maximum number of bytes of memory that are available to be allocated to an interleaver”

To the extent TQ Delta contends that any reference charted in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 does not disclose “transmitting or receiving a message during initialization specifying a maximum number of bytes of memory that are available to be allocated to an interleaver,” or any similar variation thereof (*see, e.g.*, claims 9 and 13 of the ’882 patent, claims 10 and 28 of the ’5473 patent, claims 1 and 4 of the ’608 patent, and claim 21 of the ’510 patent), it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510. A person having ordinary skill in the art would have been motivated to employ or implement that feature. *See* ITU-T G.993.1 at 62 (“Initialization of a VTU-O/VTU-R pair includes a variety of tasks,” including “Exchange of parameters (RS settings, interleaver parameters, VOC settings, bit loading and energy tables, . . .). At least the requirement of transmitting or receiving a message during initialization is a requisite step in DSL communications, thus, a person of ordinary skill in the art would have been motivated, at the time

of the invention, to employ or implement that feature. Indeed, employing initialization steps that includes generating and transmitting a message would have accomplished the goal of initializing the transceiver for data transmission. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(2) It would have been obvious to modify any primary reference for “wherein the shared memory allocated to the interleaver is used at the same time as the shared memory allocated to the deinterleaver”

To the extent TQ Delta contends that any reference charted in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 does not disclose “wherein the shared memory allocated to the interleaver is used at the same time as the shared memory allocated to the deinterleaver,” it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510. A person having ordinary skill in the art would have been motivated to employ or implement that feature. *See Mazzoni* at 2:37–56 (“Using convolutional triangular interleaving (and, consequently, convolutional triangular deinterleaving) instead of other conventional types of interleaving is particularly beneficial because it reduces latency generated by the memory.”); *see also Mazzoni* at 1:59–65; 6:21–30; 5:61–67; 10:22–42; 3:43–48; 6:51–8:10; LB-031 at 3. Employing convolutional interleaving and deinterleaving at the same time inherently implies that the memory may be used at the same time. *Id.* Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(3) It would have been obvious to modify any primary reference for “wherein a sum of a maximum amount of the memory that can be allocated to the interleaving function and a maximum amount of the memory that can be allocated to the deinterleaving function is more than a total amount of the memory”

To the extent TQ Delta contends that any reference charted in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 does not disclose “wherein a sum of a maximum amount of the memory that can be allocated to the interleaving function and a maximum amount of the memory that can be allocated to the deinterleaving function is more than a total amount of the memory,” it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510. A person having ordinary skill in the art would have been motivated to employ or implement that feature. See Mazzoni at 2:37–49 (“More specifically, the channel coding/decoding stage may include Reed-Solomon coding/decoding means of length N (where $N=240$ bytes, for example). The interleaving means are then adapted to effect convolutional interleaving of I branches with $i-1$ blocks of N bytes. The deinterleaving means are adapted to implement convolutional deinterleaving with I' branches of $i'-1$ blocks of M' bytes. I and I' are sub-multiples of N , and i and i' are the current relative indexes of the branches. The size in bytes of the first memory space is equal to $I \times (I-1) \times M/2$, and the size in bytes of the second memory space is equal to $I' \times (I'-1) \times M'/2$. The sizes of the two memory spaces are set by I , I' , M and M' .”). Moreover, Mazzoni explains that “[t]he size of each of the two memory spaces [for the interleaver and deinterleaver] may be set as a function of the bit rate actually processed by the device.” Mazzoni at Abstract. A person of ordinary skill in the art would thus have been motivated to employ that

feature to fully utilize such a flexible memory allocation feature as disclosed in Mazzoni. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(4) It would have been obvious to modify any primary reference for “wherein the allocated memory for the interleaver does not exceed the maximum number of bytes specified in the message”

To the extent TQ Delta contends that any reference charted in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 does not disclose “wherein the allocated memory for the interleaver does not exceed the maximum number of bytes specified in the message,” it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510. A person having ordinary skill in the art would have been motivated to employ or implement that feature. *See* Mazzoni at 1:19–27; LB-031 at 2–6. Indeed, a person of ordinary skill in the art would understand that a transceiver would not allocate memory to itself in a manner that was inconsistent with its indicated capabilities. Thus, little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(5) It would have been obvious to modify any primary reference for “wherein the first maximum number of bytes associated with the interleaver function of the transmit latency path is different than the second maximum number of bytes associated with the interleaver function of the transmit latency path, and wherein the first maximum number of bytes associated with the deinterleaver function of the receive latency path is different than

the second maximum number of bytes associated with the deinterleaver function of the receive latency path”

To the extent TQ Delta contends that any reference charted in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 does not disclose “wherein the first maximum number of bytes associated with the interleaver function of the transmit latency path is different than the second maximum number of bytes associated with the interleaver function of the transmit latency path, and wherein the first maximum number of bytes associated with the deinterleaver function of the receive latency path is different than the second maximum number of bytes associated with the deinterleaver function of the receive latency path,” it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510. A person having ordinary skill in the art would have been motivated to employ or implement that feature. See Mazzoni at 1:53–57 (“Still another object of the invention is to provide such an architecture which is adaptable, particularly in terms of the memory capacity of the interleaving and deinterleaving means, to suit a number of different bit rates selected from a predetermined group of bit rates.”); 6:37–50 (“The parameters I , I' , M and M' can be determined from the above capacities. More particularly, the size of the first memory space needed to implement triangular convolutional interleaving with I branches of $i-1$ blocks of M bytes is equal to $I \times (I-1) \times M/2$. Similarly, the size of the second memory space ESM2 required to support the uplink bit rate is equal to $I' \times (I'-1) \times M'/2$. Also, I and I' must be sub-multiples of the size N of the Reed-Solomon code. Since $I \times (I-1) \times M/2$ must be equal to 24,960, it is possible to choose $I=40$ and $M=32$. Similarly, because $I' \times (I'-1) \times M'/2$ must be at least equal to 1,920, it is possible to choose $I'=24$ and $M'=7$. This requires

a slight increase in size to 1,932 to facilitate the implementation. The final size of the memory MM is therefore equal to 26 892 bytes.”). A person of ordinary skill in the art would thus have been motivate to employ this feature because it would be of little use to adjust a memory allocation based on changing channel conditions without actually adjusting that allocation. Thus, little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

e) Additional Reasons to Combine.

In addition to the information contained elsewhere in these invalidity contentions, including in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510, Nokia Defendants have identified additional motivations and reasons to combine the various references. Nokia Defendants note that in *KSR Int’l Co. v. Teleflex Inc.*, the Supreme Court held that “[i]n determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. What matters is the objective reach of the claim. If the claim extends to what is obvious, it is invalid under § 103.” 127 S. Ct. 1727, 1742 (2007).

KSR further illustrated several ways in which the subject matter of a patent claim may be shown to have been obvious. For instance, “[o]ne of the ways in which a patent’s subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent’s claims.” *KSR*, 127 S. Ct. at 1742. The Supreme Court held that it was error to “look only to the problem the patentee was trying to solve.” *Id.* As the Court explained, “[t]he question is not whether the combination was obvious to the patentee but whether the combination was obvious to a person with ordinary skill in the art.

Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *Id.* Further, “[c]ommon sense teaches ... that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle.” *Id.* Further, a showing that a combination of elements was “obvious to try” may demonstrate that it was obvious under § 103. *Id.* For instance, the Supreme Court held that “predictable solutions” using a combination of “known options” may render the subject matter of a patent claim obvious. *Id.*

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product was not of innovation but of ordinary skill and common sense. *Id.* The ways in which the subject matter of a patent claim may be shown to be obvious, identified by *KSR*, are merely illustrative. A core thrust of *KSR* was that “[r]igid preventative rules that deny factfinders recourse to common sense are neither necessary under our case law nor consistent with it.” *KSR*, 127 S. Ct. at 1742-43 (quoting *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1367 (Fed. Cir. 2006) (“Our suggestion test is in actuality quite flexible and not only permits, but requires, consideration of common knowledge and common sense”), and *Alza Corp. v. Mylan Labs., Inc.*, 464 F.3d 1286, 1291 (Fed. Cir. 2006) (“There is flexibility in our obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires an actual teaching to combine ...”).

Although Nokia Defendants note that there is no longer a rigid requirement regarding motivation to combine under *KSR*, Nokia Defendants provide the following statements regarding

motivation to combine. Multiple teachings, suggestions, and/or reasons to modify any of the references and/or to combine any two or more of the references in Exhibits F3-882A – F3-882F, F3-5473A – F3-5473F, F3-608A – F3-608F, F3-510A – F3-510F and F3 Secondary-882, F3 Secondary-5473, F3 Secondary-608, F3 Secondary-510 come from many sources, including the prior art (specific and as a whole), common knowledge, common sense, predictability, expectations, industry trends, design incentives or need, market demands or pressure, market forces, obvious to try, the nature of the problem faced, and/or knowledge possessed by one of ordinary skill. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one.

The combination of prior art references identified in these contentions would have been obvious because the combination represents the known potential options with a reasonable expectation of success. Additionally, one of ordinary skill in the art would have been motivated to create combinations identified in these contentions using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or teaching, suggestion, or motivation in the prior art generally. Also, market forces in the industry, and the desire to improve features and performance, would motivate the addition of features to systems as they became available, became less expensive, became more commonly used, provided better performance, reduced costs, size or weight, or predictably achieved other desirable results.

C. Other Grounds for Invalidity

Nokia Defendants identify the following additional grounds for invalidity of the Asserted Claims of the Family 3 Patents. Nokia Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

1. Invalidity of the Family 3 Patents Based on 35 U.S.C. § 112, ¶ 1 (Enablement and Written Description)

Based on Nokia Defendants' present understanding of TQ Delta's asserted scope of the claims of the Family 3 Patents, to the extent such positions can be understood from TQ Delta's Preliminary Infringement Contentions, the Asserted Claims of the Family 3 Patents are invalid for reciting at least the following claim terms, phrases, or limitations that lack enablement or sufficient written description:

- “a maximum number of bytes of memory that are available to be allocated” (’882 Patent, claims 9 and 13)
- “wherein the shared memory allocated to the [interleaver/deinterleaver] is used at the same time as the shared memory allocated to the [deinterleaver/interleaver]” (’882 Patent, claims 9 and 13)
- “a maximum amount of the memory that can be allocated” (’5473 Patent, claim 36)
- “wherein at least a portion of the memory may be allocated to the interleaving function or the deinterleaving function at any one particular time” (’5473 Patent, claim 28)
- “wherein the generated message indicates how the memory has been allocated between the interleaving function and the deinterleaving function” (’5473 Patent, claim 28)
- “maximum number of bytes associated with the [interleaver/deinterleaver]” (’608 Patent, claims 1, 2, 3, 4)
- “a change in [a/the] channel condition[s] [for the channel]” (’608 Patent, claims 1 and 4; ’510 Patent, claim 2)

- “wherein the sharing comprises using a first portion of the memory for the interleaver function and simultaneously using a second portion of the memory” (’608 Patent, claim 2)
- “one or more bytes of the memory can be used by the interleaver function at one particular time and the same one or more bytes of the memory can be used by the deinterleaver function at a second time, different than the first time” (’608 Patent, claim 2)
- “wherein one or more bytes of memory is used by the interleaver function of the transmitter portion at the first time and the same one or more bytes of the memory are used by the deinterleaver function of the receiver portion at the second time” (’608 Patent, claim 4)

These claim terms, phrases, and limitations, as apparently construed by TQ Delta, fail to satisfy the enablement and/or written description requirements of 35 U.S.C. § 112. This is at least because the specifications of the Family 3 Patents demonstrate that the patentee neither conceived of nor demonstrated possession of all that TQ Delta now contends the claims cover. In addition, based on Defendant’s present understanding of TQ Delta’s Preliminary Infringement Contentions, each of the Asserted Claims of the Family 3 Patents in which these claim terms, phrases, and limitations appear is invalid because the specification fails to provide sufficient disclosure to enable a person of ordinary skill in the art to which the alleged invention pertains, or with which it is most nearly connected, to implement the alleged invention without undue experimentation.

2. Invalidity of the Family 3 Patents Based on 35 U.S.C. § 112, ¶ 2 (Indefiniteness)

Based on Nokia Defendants’ present understanding of TQ Delta’s asserted scope of the claims of the Family 3 Patents, to the extent such positions can be understood from TQ Delta’s Preliminary Infringement Contentions, Nokia Defendants assert that the Asserted Claims of the Family 3 Patents are invalid for reciting at least the following indefinite claim terms, phrases, or limitations:

- “a maximum number of bytes of memory that are available to be allocated” (’882 Patent, claims 9 and 13)
- “wherein the shared memory allocated to the [interleaver/deinterleaver] is used at the same time as the shared memory allocated to the [deinterleaver/interleaver]” (’882 Patent, claims 9 and 13)
- “a maximum amount of the memory that can be allocated” (’5473 Patent, claim 36)
- “wherein at least a portion of the memory may be allocated to the interleaving function or the deinterleaving function at any one particular time” (’5473 Patent, claim 28)
- “wherein the generated message indicates how the memory has been allocated between the interleaving function and the deinterleaving function” (’5473 Patent, claim 28)
- “maximum number of bytes associated with the [interleaver/deinterleaver]” (’608 Patent, claims 1, 2, 3, 4)
- “a change in [a/the] channel condition[s] [for the channel]” (’608 Patent, claims 1 and 4; ’510 Patent, claim 2)
- “wherein the sharing comprises using a first portion of the memory for the interleaver function and simultaneously using a second portion of the memory” (’608 Patent, claim 2)
- “one or more bytes of the memory can be used by the interleaver function at one particular time and the same one or more bytes of the memory can be used by the deinterleaver function at a second time, different than the first time” (’608 Patent, claim 2)
- “wherein one or more bytes of memory is used by the interleaver function of the transmitter portion at the first time and the same one or more bytes of the memory are used by the deinterleaver function of the receiver portion at the second time” (’608 Patent, claim 4)

These claim terms, phrases, and limitations, as apparently construed by TQ Delta, violate the definiteness requirements of 35 U.S.C. § 112.

Based on Nokia Defendants’ present understanding of TQ Delta’s Preliminary Infringement Contentions, these claim terms, phrases, and limitations are indefinite because they are inconsistent with and broader than the alleged invention disclosed in the specification and

during prosecution. And given TQ Delta's apparent constructions of the claim terms, phrases, and limitations, persons of ordinary skill in the art at the time of the invention would not have understood what is claimed with reasonable certainty, even when the claims are read in light of the specification and prosecution history.

3. Invalidity of the Family 3 Patents under 35 U.S.C. § 112 ¶ 2 Based on Mixed Method and Apparatus Claims

Further, Claims 9 and 13, and dependent claims 14 and 15, of the '882 Patent are indefinite because they purport to cover mixed subject matter, they are system claims that require the performance of method steps.

4. Additional Grounds for Invalidity of the Family 3 Patents

In addition to the preceding invalidity contentions, Nokia Defendants reserve the right to assert that the Asserted Claims are invalid under 35 U.S.C. § 102(f) and/or § 102(g) in the event that Nokia Defendants obtain evidence that the named inventor(s) of the Family 3 Patents did not invent (either alone or in conjunction with other parties) the subject matter claimed in the Family 3 Patents. Should Nokia Defendants obtain such evidence, Nokia Defendants will provide the name of the person(s) from whom and the circumstances under which the invention or any part of it was derived, and/or the circumstances surrounding the making of the invention before the patent application.

Nokia Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

V. THE ASSERTED FAMILY 4 PATENT IS INVALID.

A. Identification of Prior Art

Nokia Defendants contend that the prior art references described and charted in Exhibits F4-008A – F4-008N and F4 Secondary-008 anticipate and/or render obvious, alone or in combination, the Asserted Claim of the Family 4 Patent.

B. The Asserted Claims Are Anticipated and/or Rendered Obvious.

TQ Delta asserts claim 14 of U.S. Patent No. 8,090,008 against Nokia Defendants in this lawsuit. The claim is invalid because the Family 4 Patent fails to meet one or more of the requirements for patentability. The individual bases for invalidity are provided below and in F4-008A – F4-008N and F4 Secondary-008. Each of the prior art references, the underlying work, and/or the underlying apparatus or method qualifies as prior art under one or more sections of 35 U.S.C. §§ 102 and/or 103.

In an effort to focus the issues, Nokia Defendants have cited representative portions of identified references, even where a reference may contain additional disclosures or support for a particular claim element. Each and every disclosure of the same limitation in the same reference is not necessarily identified. In addition, persons of ordinary skill in the art generally read a prior art reference as a whole and in the context of other publications and literature and in the context of their knowledge as persons of ordinary skill in the art. Thus, to understand and interpret any specific statement or disclosure within a prior art reference, such persons would rely on other information within the reference, along with other publications and their general scientific knowledge and experience in the field. Thus, each prior art reference identified herein should be understood in the context of the reference itself, in conjunction with anything incorporated by reference or described as relevant technology by the reference, any documents that are referred to

for further understanding by the reference, any system embodying the reference, and any testimony by those with knowledge of the reference, such as the named authors and inventors. Nokia Defendants may rely on uncited portions of the prior art references and on other publications and expert testimony to provide context, and as aids to understanding and interpreting the portions that are cited. Nokia Defendants may also rely on uncited portions of the prior art references, other disclosed publications, and the testimony of experts to establish that a person of ordinary skill in the art would have been motivated to modify or combine certain of the cited references so as to render the claims obvious.

1. The Family 4 Patent Priority Date.

TQ Delta's Preliminary Infringement Contentions allege that the Asserted Claim of the Family 4 Patent is entitled at least to the priority date of November 9, 1999 or, in the alternative, November 9, 2000 or, in the alternative, August 26, 2005, or in the alternative, September 28, 2007, or, in the alternative, October 22, 2008. To the extent TQ Delta alleges that any prior art relied on in these invalidity contentions does not qualify as prior art to an Asserted Patent, Nokia Defendants reserve the right to rebut those allegations (*e.g.*, by demonstrating an earlier relevant date for the challenged prior art and/or a later priority date for the Asserted Patent and/or Asserted Claim).

2. The Family 4 Patent Is Anticipated and/or Rendered Obvious by the Prior Art.

The Asserted Claim of the Family 4 Patent is invalid as anticipated and/or rendered obvious under 35 U.S.C. §§ 102 and/or 103 in view of each of the primary prior art references identified in the claim charts included in Exhibits F4-008A – F4-008N, which identify specific examples of where each limitation of the Asserted Claim is found in the prior art references. As explained above, the cited portions of prior art references identified in the attached claim charts are

exemplary in nature and representative of the content and teaching of the prior art references, and should be understood in the context of the reference as a whole and as they would be understood by a person of ordinary skill in the art.

Nokia Defendants identify the following references as anticipating and/or rendering obvious the Asserted Claim of the Family 4 Patent under 35 U.S.C. §§ 102 and/or 103. The table of anticipating and/or rendering obvious references below is exemplary, and it does not constitute an admission that any reference not listed below does not also anticipate and/or render obvious the claim of the Family 4 Patent. Further, Nokia Defendants contend that any prior art reference in the attached charts that is charted for each limitation of any given claim, anticipates that claim, regardless of whether that prior art reference is listed in the following table.

Exhibit	Primary Prior Art	Date³
F4-008A	U.S. Patent No. 6,125,103 to Bauml (“Bauml”)	September 3, 1997
F4-008B	U.S. Patent No. 6,556,557 to Cimini (“Cimini”)	June 2, 1999
F4-008C	U.S. Patent No. 6,963,599 to Dunn (“Dunn”)	December 30, 1992
F4-008D	U.S. Patent No. 6,781,951 to Fifield (“Fifield”)	October 22, 1999
F4-008E	U.S. Patent No. 5,682,376 to Hayashino (“Hayashino”)	December 14, 1995
F4-008F	U.S. Patent No. 6,310,869 to Holtzman (“Holtzman”)	August 31, 1998
F4-008G	U.S. Patent No. 6,301,268 to Laroia (“Laroia”)	March 10, 1998

³ Nokia Defendants reserve the right to identify additional bases for qualification as prior art for each of the identified references in the event that it is determined that the Asserted Patents are not entitled to the claimed priority date.

Exhibit	Primary Prior Art	Date³
F4-008H	EP Patent No. 0743768 to Narahashi (“Narahashi”)	December 4, 1995
F4-008I	U.S. Patent No. 6,625,219 to Stopler (“Stopler”)	February 26, 1999
F4-008J	U.S. Patent No. 6,088,406 to Suzuki (“Suzuki 406”)	August 20, 1997
F4-008K	U.S. Patent No. 5,903,614 to Suzuki (“Suzuki 416”)	December 24, 1997
F4-008L	U.S. Patent No. 6,657,949 to Jones (“Jones”)	July 6, 1999
F4-008M	EP Patent No. 0895389 to Williams (“Williams”)	July 27, 1998
F4-008N	U.S. Patent No. 4,924,516 to Bremer (“Bremer”)	May 23, 1989

To the extent any item of prior art cited above is deemed not to disclose and/or render obvious, explicitly or inherently, any limitation of the Asserted Claim of the Family 4 Patent, Nokia Defendants reserve the right to argue that any difference between that prior art and the corresponding patent claim would have been either inherent in the art or obvious to a person of ordinary skill in the art, even if Nokia Defendants have not specifically denoted that the art is to be combined with the knowledge of a person of ordinary skill in the art.

3. The Family 4 Patent Is Obvious Over the Prior Art.

To the extent TQ Delta argues that any limitation of the Asserted Claim of the Family 4 Patent is not explicitly disclosed and/or rendered obvious by an item of prior art identified above and in Exhibits F4-008A – F4-008N and F4 Secondary-008, any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the

art. The item of prior art would, therefore, render such claims invalid as obvious under 35 U.S.C. § 103.

a) The Claims Are Obvious Over the Primary References in Light of One or More Secondary References.

To the extent the foregoing references are found not to anticipate and/or render obvious the Asserted Claim of the Family 4 Patent, the foregoing references render the Asserted Claim obvious, either alone or in combination with one or more of the other references identified above. One of ordinary skill in the art would have been motivated to combine the various references cited above and herein so as to disclose each and every limitation of the Asserted Claim of the Family 4 Patent.

Prior art references rendering the Asserted Claim of the Family 4 Patents obvious, either alone or in combination with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008, are provided in the tables above and below and in Exhibits F4-008A – F4-008N and F4 Secondary-008. The prior art identified in Exhibits F4-008A – F4-008N render the Asserted Claim of the Family 4 Patent obvious when the references are read in combination with one or more of each other, when read in combination with any of the prior art identified in F4 Secondary-008, and/or when read in view of the state of the art and knowledge of those skilled in the art.

F4 Secondary Exhibits	Date
U.S. Patent No. 5,694,415 to Suzuki (“Suzuki 415”)	November 14, 1995
U.S. Patent No. 6,590,860 to Sakoda (“Sakoda”)	March 19, 1997
U.S. Patent No. 6,590,893 to Hwang (“Hwang”)	April 7, 1999
U.S. Patent No. 6,144,696 to Shively (“Shively”)	December 31, 1997

F4 Secondary Exhibits	Date
EP Patent No. 0552034 to Kaku (“Kaku”)	January 14, 1993
U.S. Prov. No. 60/164,134 (“AAPA-1”)	January 16, 2001
U.S. 7,292,627 (“AAPA-2”)	November 9, 2000
Par Reduction without Noise Enhancement T1E1.4/97-270 (“Djokovic”)	September 22, 1997
Standards Project for Interfaces Relating to Carrier Customer Connection of Asymmetrical Digital Subscriber Line (ADSL) Equipment (“T1.413-1998”)	June 5, 1998
Network and Customer Installation Interfaces – Asymmetric Digital Subscriber Line (ADSL) Metallic Interface (“T1.413-1995”)	August 18, 1995
Dynamic Power Save in xDSL Part 2: Impact on PMS-TC and PMD Layers (“T1E1.4/98-194”)	June 1, 1998

To the extent TQ Delta argues that the Asserted Claim of the Family 4 Patent is not disclosed or rendered obvious by any Exhibits F4-008A – F4-008N reference, the Asserted Claims nevertheless would have been obvious in light of one or more other Exhibits F4-008A – F4-008N references and/or one or more references identified and charted in Exhibits F4 Secondary-008, and in view of the knowledge, experience, and understanding of persons of ordinary skill in the art.

Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with another to render obvious (and therefore invalid) each of TQ Delta’s Asserted Claims. Nokia Defendants may rely

on a subset of (or all of) the above-identified references, including all references in Exhibits F4-008A – F4-008N and F4 Secondary-008, for purposes of obviousness depending on the Court’s claim construction, positions taken by TQ Delta during this litigation, and further investigation and discovery.

b) Exemplary Combinations of the Prior Art.

The table below provides an identification of exemplary combinations of prior art references that, based on Nokia Defendants’ present understanding of TQ Delta’s Preliminary Infringement Contentions and apparent reading of the Asserted Claims, render obvious the Asserted Claim of the Family 4 Patent. The combinations of references identified below are non-exhaustive, and additional examples are apparent from other combinations of references addressed in Exhibits F4-008A – F4-008N and F4 Secondary-008. Nokia Defendants expressly note that, although certain references charted in Exhibits F4-008A – F4-008N are listed variously in the left or right column below, Defendant does not thereby imply any restriction as to which Exhibits F4-008A – F4-008N reference is primary and which Exhibits F4-008A – F4-008N reference is secondary in such a combination. Defendant reserves the right to rely on either identified reference in the identified combinations as a primary and/or secondary reference.

Reference	Combination References
U.S. Patent No. 6,125,103 to Bauml (“Bauml”)	Cimini, Dunn, Fifield, Hayashino, Holtzman, Laroia, Narahashi, Stopler, Suzuki 406, Suzuki 416, Jones, William, Bremer, and/or one or more references charted in Exhibit F4 Secondary-008
U.S. Patent No. 6,556,557 to Cimini (“Cimini”)	Bauml, Dunn, Fifield, Hayashino, Holtzman, Laroia, Narahashi, Stopler, Suzuki 406, Suzuki 416, Jones, William, Bremer, and/or one or more references charted in Exhibit F4 Secondary-008
U.S. Patent No. 6,963,599 to Dunn (“Dunn”)	Bauml, Cimini, Fifield, Hayashino, Holtzman, Laroia, Narahashi, Stopler, Suzuki 406, Suzuki 416, Jones, William, Bremer, and/or one or more references charted in Exhibit F4 Secondary-008
U.S. Patent No. 6,781,951 to Fifield (“Fifield”)	Bauml, Cimini, Dunn, Hayashino, Holtzman, Laroia, Narahashi, Stopler, Suzuki 406, Suzuki 416, Jones, William, Bremer, and/or one or more references charted in Exhibit F4 Secondary-008
U.S. Patent No. 5,682,376 to Hayashino (“Hayashino”)	Bauml, Cimini, Dunn, Fifield, Holtzman, Laroia, Narahashi, Stopler, Suzuki 406, Suzuki 416, Jones, William, Bremer, and/or one or more references charted in Exhibit F4 Secondary-008
U.S. Patent No. 6,310,869 to Holtzman (“Holtzman”)	Bauml, Cimini, Dunn, Fifield, Hayashino, Laroia, Narahashi, Stopler, Suzuki 406, Suzuki 416, Jones, William, Bremer, and/or one or more references charted in Exhibit F4 Secondary-008
U.S. Patent No. 6,301,268 to Laroia (“Laroia”)	Bauml, Cimini, Dunn, Fifield, Hayashino, Holtzman, Narahashi, Stopler, Suzuki 406, Suzuki 416, Jones, William, Bremer, and/or one or more references charted in Exhibit F4 Secondary-008

EP Patent No. 0743768 to Narahashi ("Narahashi")	Bauml, Cimini, Dunn, Fifield, Hayashino, Holzman, Laroia, Stopler, Suzuki 406, Suzuki 416, Jones, William, Bremer, and/or one or more references charted in Exhibit F4 Secondary-008
U.S. Patent No. 6,625,219 to Stopler ("Stopler")	Bauml, Cimini, Dunn, Fifield, Hayashino, Holzman, Laroia, Narahashi, Suzuki 406, Suzuki 416, Jones, William, Bremer, and/or one or more references charted in Exhibit F4 Secondary-008
U.S. Patent No. 6,088,406 to Suzuki ("Suzuki 406")	Bauml, Cimini, Dunn, Fifield, Hayashino, Holzman, Laroia, Narahashi, Stopler, Suzuki 416, Jones, William, Bremer, and/or one or more references charted in Exhibit F4 Secondary-008
U.S. Patent No. 5,903,614 to Suzuki ("Suzuki 416")	Bauml, Cimini, Dunn, Fifield, Hayashino, Holzman, Laroia, Narahashi, Stopler, Suzuki 406, Jones, William, Bremer, and/or one or more references charted in Exhibit F4 Secondary-008
U.S. Patent No. 6,657,949 to Jones ("Jones")	Bauml, Cimini, Dunn, Fifield, Hayashino, Holzman, Laroia, Narahashi, Stopler, Suzuki 406, Suzuki 416, William, Bremer, and/or one or more references charted in Exhibit F4 Secondary-008
EP Patent No. 0895389 to Williams ("Williams")	Bauml, Cimini, Dunn, Fifield, Hayashino, Holzman, Laroia, Narahashi, Stopler, Suzuki 406, Suzuki 416, Jones, Bremer, and/or one or more references charted in Exhibit F4 Secondary-008
U.S. Patent No. 4,924,516 to Bremer ("Bremer")	Bauml, Cimini, Dunn, Fifield, Hayashino, Holzman, Laroia, Narahashi, Stopler, Suzuki 406, Suzuki 416, Jones, Williams, and/or one or more references charted in Exhibit F4 Secondary-008

It would have been obvious to combine these references for reasons that are readily apparent to one of ordinary skill in the art, and for reasons explained herein.

c) Prior Art Solutions

In addition to the exemplary combinations provided above, to the extent TQ Delta alleges the references in Exhibits F4-008A – F4-008N and F4 Secondary-008 do not disclose any particular limitation of the Asserted Claim of the Family 4 Patent either expressly or inherently, it would have been obvious to a person of ordinary skill in the art as of the alleged invention date of the Family 4 Patent to modify the references in Exhibits F4-008A – F4-008N and F4 Secondary-008 and/or combine the teachings of the references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with the other prior art references in Exhibits F4-008A – F4-008N and F4 Secondary-008 in a manner that would have rendered the Asserted Claim invalid as obvious. Nokia Defendants provide examples of such combinations below. The exemplary combinations below are non-exhaustive, and Nokia Defendants reserve the right to rely on additional combinations as may be apparent from the prior art references in Exhibits F4-008A – F4-008N and F4 Secondary-008. These obviousness combinations should not be construed to suggest that any reference included in any combination is not anticipatory in its own right.

(1) Exemplary Bauml Solutions

A person of ordinary skill in the art would be motivated to combine Bauml with Cimini for many reasons. For example, Bauml describes “a method and device, whereby a definite reduction of signal peaks is achieved with moderate expenditure.” *See, e.g.*, Bauml at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Bauml to implement the details of “reducing the peak to average power ratio (PAP) of a signal with low computational complexity” taught by Cimini because, it is also directed at communication systems. Cimini at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “PAP of an OFDM signal”

Cimini at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Bauml with Cimini because (a) Bauml and Cimini disclose similar products, such as communication systems; (b) Cimini is assigned to AT&T Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Cimini's teachings with those of Bauml. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bauml with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bauml with Dunn for many reasons. For example, Bauml describes “a method and device, whereby a definite reduction of signal peaks is achieved with moderate expenditure.” *See, e.g.*, Bauml at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Bauml to implement the details of “multitone frequency hop[ping]” taught by Dunn because, it is also directed at communication systems. Dunn at 3:42. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased” Dunn at 1:10-12. In addition, a person of ordinary skill in the art would be motivated to combine Bauml with Dunn because (a) Bauml and Dunn disclose similar products, such as communication systems; (b) Dunn was filed by ITT Manufacturing Enterprises LLC, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had

a reasonable expectation of success in incorporating Dunn’s teachings with those of Bauml. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bauml with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bauml with Fifield for many reasons. For example, Bauml describes “a method and device, whereby a definite reduction of signal peaks is achieved with moderate expenditure.” *See, e.g.*, Fifield at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Bauml to implement the details of “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully” taught by Fifield because, it is also directed at communication systems. Fifield at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “alleviat[ing] the problem that certain packets are very difficult to transmit” Fifield at 2:33-34. In addition, a person of ordinary skill in the art would be motivated to combine Bauml with Fifield because (a) Bauml and Fifield disclose similar products, such as communication systems; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Fifields’s teachings with those of Bauml. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bauml with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bauml with Hayashino for many reasons. For example, Bauml describes “a method and device, whereby a definite reduction of signal peaks is achieved with moderate expenditure.” *See, e.g.*, Bauml at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or

device of Bauml to implement the details of “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath” taught by Hayashino because, it is also directed at communication systems. Hayashino at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “transmitting an OFDM signal which causes no waveform distortion in a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave through a multipath, and a transmitter and a receiver thereof” Hyashino at 3:39-45. In addition, a person of ordinary skill in the art would be motivated to combine Bauml with Hayashino because (a) Bauml and Hayashino disclose similar products, such as communication systems; (b) Hayashino was filed by Panasonic Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hayashino’s teachings with those of Bauml. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bauml with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bauml with Holtzman for many reasons. For example, Bauml describes “a method and device, whereby a definite reduction of signal peaks is achieved with moderate expenditure.” *See, e.g.*, Bauml at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Bauml to implement the details of “reduc[ing] peak to average power in signals

transmitted in a wireless communications system,” taught by Holtzman because, it is also directed at communication systems. Holtzman at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “reducing amplitude and interference in wireless communication systems” Holtzman at 1:12. In addition, a person of ordinary skill in the art would be motivated to combine Bauml with Holtzman because (a) Bauml and Holtzman disclose similar products, such as communication systems; (b) Holtzman was filed by Qualcomm, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Holtzman’s teachings with those of Bauml. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bauml with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bauml with Laroia for many reasons. For example, Bauml describes “a method and device, whereby a definite reduction of signal peaks is achieved with moderate expenditure.” *See, e.g.*, Bauml at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Bauml to implement the details of “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system” taught by Laroia because, it is also directed at communication systems. Laroia at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as lowering peak power. Laroia at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Bauml

with Laroia because (a) Bauml and Laroia disclose similar products, such as communication systems; (b) Laroia was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Laroia's teachings with those of Bauml. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bauml with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bauml with Narahashi for many reasons. For example, Bauml describes a “a method and device, whereby a definite reduction of signal peaks is achieved with moderate expenditure.” *See, e.g.*, Bauml at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Bauml to implement the details of “a signal multiplexer” taught by Narahashi because, it is also directed at “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g.*, Narahashi at [0014]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “signal with a relatively low level of distortion.” *See, e.g.*, Narahashi at [0015]. In addition, a person of ordinary skill in the art would be motivated to combine Bauml with Narahashi because (a) Bauml and Narahashi disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Narahashi's teachings with those of Bauml. For similar reasons, a person

of ordinary skill in the art would be motivated to combine Bauml with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bauml with Stopler for many reasons. For example, Bauml describes a “a method and device, whereby a definite reduction of signal peaks is achieved with moderate expenditure.” *See, e.g.*, Bauml at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Bauml to implement the details of “method and apparatus for encoding/framing a data stream of multitone modulated signals” taught by Stopler because, it is also directed “to improve impulse burst immunity.” *See, e.g.*, Stopler at 1:9-11. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “diagonalization scheme [] used to provide immunity against impulse noise, while at the same time allowing for a simple method of utilizing tones of different loading.” *See, e.g.*, Stopler at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Bauml with Stopler because (a) Bauml and Stopler disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Stopler’s teachings with those of Bauml. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bauml with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bauml with Suzuki 406 for many reasons. For example, Bauml describes a “a method and device, whereby a definite reduction of signal peaks is achieved with moderate expenditure.” *See, e.g.*, Bauml at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device

of Bauml to implement the details of a “receiving method of receiving, demodulating and encoding a signal” taught by Suzuki 406 because, it is also directed “reception of a multicarrier signal in the form of burst data.” *See, e.g.*, Suzuki 406 at 1:8-13. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “suppressed interference of communication of adjacent cells.” *See, e.g.*, Suzuki 406 at 1:56-60. In addition, a person of ordinary skill in the art would be motivated to combine Bauml with Suzuki 406 because (a) Bauml and Suzuki 406 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 406’s teachings with those of Bauml. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bauml with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bauml with Suzuki 416 for many reasons. For example, Bauml describes a “a method and device, whereby a definite reduction of signal peaks is achieved with moderate expenditure.” *See, e.g.*, Bauml at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Bauml to implement the details of a “communication method and receiving apparatus” taught by Suzuki 416 because, it is also directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increased transmission capacity.” In addition, a person of ordinary skill in the art would be motivated to combine Bauml with Suzuki 416 because (a) Bauml and Suzuki 416 disclose similar products, such as data transmission in communication systems and (b)

both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 416's teachings with those of Bauml. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bauml with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bauml with Jones for many reasons. For example, Bauml describes a “a method and device, whereby a definite reduction of signal peaks is achieved with moderate expenditure.” *See, e.g.*, Bauml at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Bauml to implement the details of a “[e]fficient request access for OFDM systems” taught by Jones because, it is also directed toward transmitting “for efficient multiplexing of multiple access requests.” *See, e.g.*, Jones at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increase[d] [] number of access requests that may be accommodated within a single burst and/or allows for greater redundancy in transmission of access request data.” In addition, a person of ordinary skill in the art would be motivated to combine Bauml with Jones because (a) Bauml and Jones disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Jones's teachings with those of Bauml. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bauml with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bauml with Williams for many reasons. For example, Bauml describes a “a method and device, whereby a definite reduction of signal peaks is achieved with moderate expenditure.” *See, e.g.*, Bauml at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Bauml to implement the details of a “[a] digital transmission system with high immunity to dynamic linear distortion” taught by Williams because, it is also directed toward improved immunity of data. *See, e.g.*, Williams at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as use of “a modulation system . . . that can maintain control over coefficient values at all frequencies.” In addition, a person of ordinary skill in the art would be motivated to combine Bauml with Williams because (a) Bauml and Williams disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Williams’s teachings with those of Bauml. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bauml with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bauml with Bremer for many reasons. For example, Bauml describes a “a method and device, whereby a definite reduction of signal peaks is achieved with moderate expenditure.” *See, e.g.*, Bauml at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Bauml to implement the details of a “method and systems for a synchronized pseudo-random privacy modem” taught by Bremer because, it is also directed toward improved transmission of

data. *See, e.g.*, Bremer at Title, Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such “increased privacy” in transmitting data. In addition, a person of ordinary skill in the art would be motivated to combine Bauml with Bremer because (a) Bauml and Bremer disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bremer’s teachings with those of Bauml. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bauml with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

(2) Exemplary Cimini Solution

A person of ordinary skill in the art would be motivated to combine Cimini with Bauml for many reasons. For example, Cimini describes “reducing the peak to average power ratio (PAP) of a signal with low computational complexity.” *See, e.g.*, Cimini at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Cimini to implement the details of “reducing the signal peak-to-average power ratio of the transmit signal in digital transmission procedures” taught by Bauml because, it is also directed at communication systems. Bauml at 1:5-7. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “definite reduction of signal peaks is achieved with moderate expenditure” Bauml at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Cimini with Bauml because (a) Cimini and Bauml disclose similar products, such as communication systems; (b) Bauml was filed by Telefonaktiebolaget LM Ericsson AB, a leader in the industry to which a person of ordinary skill in the art may look when seeking to

improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bauml's teachings with those of Cimini. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cimini with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Cimini with Dunn for many reasons. For example, Cimini describes “reducing the peak to average power ratio (PAP) of a signal with low computational complexity.” *See, e.g.*, Cimini at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Cimini to implement the details of “multitone frequency hop[ping]” taught by Dunn because, it is also directed at communication systems. Dunn at 3:42. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased” Dunn at 1:10-12. In addition, a person of ordinary skill in the art would be motivated to combine Cimini with Dunn because (a) Cimini and Dunn disclose similar products, such as communication systems; (b) Dunn was filed by ITT Manufacturing Enterprises LLC, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dunn's teachings with those of Cimini. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cimini with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Cimini with Fifield for many reasons. For example, Cimini describes “reducing the peak to average power ratio (PAP) of a signal with low computational complexity.” *See, e.g.*, Cimini at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Cimini to implement the details of “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully” taught by Fifield because, it is also directed at communication systems. Fifield at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “alleviat[ing] the problem that certain packets are very difficult to transmit” Fifield at 2:33-34. In addition, a person of ordinary skill in the art would be motivated to combine Cimini with Fifield because (a) Cimini and Fifield disclose similar products, such as communication systems; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Fifield’s teachings with those of Cimini. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cimini with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Cimini with Hayashino for many reasons. For example, Cimini describes “reducing the peak to average power ratio (PAP) of a signal with low computational complexity.” *See, e.g.*, Cimini at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Cimini to implement the details of “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath” taught by Hayashino because,

it is also directed at communication systems. Hayashino at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “transmitting an OFDM signal which causes no waveform distortion in a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave through a multipath, and a transmitter and a receiver thereof” Hyashino at 3:39-45. In addition, a person of ordinary skill in the art would be motivated to combine Cimini with Hayashino because (a) Cimini and Hayashino disclose similar products, such as communication systems; (b) Hayashino was filed by Panasonic Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hayashino’s teachings with those of Cimini. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cimini with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Cimini with Holtzman for many reasons. For example, Cimini describes “reducing the peak to average power ratio (PAP) of a signal with low computational complexity.” *See, e.g.*, Cimini at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Cimini to implement the details of “reduc[ing] peak to average power in signals transmitted in a wireless communications system,” taught by Holtzman because, it is also directed at communication systems. Holtzman at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “reducing amplitude and interference in wireless communication systems” Holtzman at 1:12. In addition, a person of ordinary skill in the art would

be motivated to combine Cimini with Holtzman because (a) Cimini and Holtzman disclose similar products, such as communication systems; (b) Holtzman was filed by Qualcomm, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Holtzman's teachings with those of Cimini. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cimini with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Cimini with Laroia for many reasons. For example, Cimini describes “reducing the peak to average power ratio (PAP) of a signal with low computational complexity.” *See, e.g.*, Cimini at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Cimini to implement the details of “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system” taught by Laroia because, it is also directed at communication systems. Laroia at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as lowering peak power. Laroia at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Cimini with Laroia because (a) Cimini and Laroia disclose similar products, such as communication systems; (b) Laroia was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation

of success in incorporating Laroia's teachings with those of Cimini. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cimini with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Cimini with Narahashi for many reasons. For example, Cimini describes “reducing the peak to average power ratio (PAP) of a signal with low computational complexity.” *See, e.g.*, Cimini at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Cimini to implement the details of “a signal multiplexer” taught by Narahashi because, it is also directed at “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g.*, Narahashi at [0014]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “signal with a relatively low level of distortion.” *See, e.g.*, Narahashi at [0015]. In addition, a person of ordinary skill in the art would be motivated to combine Cimini with Narahashi because (a) Cimini and Narahashi disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Narahashi's teachings with those of Cimini. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cimini with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Cimini with Stopler for many reasons. For example, Cimini describes “reducing the peak to average power ratio (PAP) of a signal with low computational complexity.” *See, e.g.*, Cimini at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Cimini to

implement the details of “method and apparatus for encoding/framing a data stream of multitone modulated signals” taught by Stopler because, it is also directed “to improve impulse burst immunity.” *See, e.g.*, Stopler at 1:9-11. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “diagonalization scheme [] used to provide immunity against impulse noise, while at the same time allowing for a simple method of utilizing tones of different loading.” *See, e.g.*, Stopler at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Cimini with Stopler because (a) Cimini and Stopler disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Stopler’s teachings with those of Cimini. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cimini with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Cimini with Suzuki 406 for many reasons. For example, Cimini describes “reducing the peak to average power ratio (PAP) of a signal with low computational complexity.” *See, e.g.*, Cimini at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Cimini to implement the details of a “receiving method of receiving, demodulating and encoding a signal” taught by Suzuki 406 because, it is also directed “reception of a multicarrier signal in the form of burst data.” *See, e.g.*, Suzuki 406 at 1:8-13. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “suppressed interference of communication of adjacent cells.” *See, e.g.*, Suzuki 406 at 1:56-60. In addition, a person of ordinary skill in the art would be motivated to combine Cimini with Suzuki 406 because (a) Cimini

and Suzuki 406 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 406's teachings with those of Cimini. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cimini with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Cimini with Suzuki 416 for many reasons. For example, Cimini describes “reducing the peak to average power ratio (PAP) of a signal with low computational complexity.” *See, e.g.*, Cimini at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Cimini to implement the details of a “communication method and receiving apparatus” taught by Suzuki 416 because, it is also directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increased transmission capacity.” In addition, a person of ordinary skill in the art would be motivated to combine Cimini with Suzuki 416 because (a) Cimini and Suzuki 416 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 416's teachings with those of Cimini. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cimini with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Cimini with Jones for many reasons. For example, Cimini describes “reducing the peak to average power ratio (PAP) of a signal with low computational complexity.” *See, e.g.*, Cimini at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Cimini to implement the details of a “[e]fficient request access for OFDM systems” taught by Jones because, it is also directed toward transmitting “for efficient multiplexing of multiple access requests.” *See, e.g.*, Jones at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increase[d] [] number of access requests that may be accommodated within a single burst and/or allows for greater redundancy in transmission of access request data.” In addition, a person of ordinary skill in the art would be motivated to combine Cimini with Jones because (a) Cimini and Jones disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Jones’s teachings with those of Cimini. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cimini with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Cimini with Williams for many reasons. For example, Cimini describes “reducing the peak to average power ratio (PAP) of a signal with low computational complexity.” *See, e.g.*, Cimini at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Cimini to implement the details of a “[a] digital transmission system with high immunity to dynamic linear distortion” taught by Williams because, it is also directed toward improved immunity of data. *See,*

e.g., Williams at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as use of “a modulation system . . . that can maintain control over coefficient values at all frequencies.” In addition, a person of ordinary skill in the art would be motivated to combine Cimini with Williams because (a) Cimini and Williams disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Williams’s teachings with those of Cimini. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cimini with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Cimini with Bremer for many reasons. For example, Cimini describes “reducing the peak to average power ratio (PAP) of a signal with low computational complexity.” *See, e.g.*, Cimini at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Cimini to implement the details of a “method and systems for a synchronized pseudo-random privacy modem” taught by Bremer because, it is also directed toward improved transmission of data. *See, e.g.*, Bremer at Title, Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such “increased privacy” in transmitting data. In addition, a person of ordinary skill in the art would be motivated to combine Cimini with Bremer because (a) Cimini and Bremer disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bremer’s teachings with those

of Cimini. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cimini with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

(3) Exemplary Dunn Solution

A person of ordinary skill in the art would be motivated to combine Dunn with Bauml for many reasons. For example, Dunn describes the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased.” *See, e.g.*, Dunn at 3:42-43. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Dunn to implement the details of “reducing the signal peak-to-average power ratio of the transmit signal in digital transmission procedures” taught by Bauml because, it is also directed at communication systems. Bauml at 1:5-7. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “definite reduction of signal peaks is achieved with moderate expenditure” Bauml at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Dunn with Bauml because (a) Dunn and Bauml disclose similar products, such as communication systems; (b) Bauml was filed by Telefonaktiebolaget LM Ericsson AB, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bauml’s teachings with those of Dunn. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dunn with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dunn with Cimini for many reasons. For example, Dunn describes the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased.” *See, e.g.,* Dunn at 3:42-43. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Dunn to implement the details of “reducing the peak to average power ratio (PAP) of a signal with low computational complexity” taught by Cimini because, it is also directed at communication systems. Cimini at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “PAP of an OFDM signal” Cimini at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Dunn with Cimini because (a) Dunn and Cimini disclose similar products, such as communication systems; (b) Cimini is assigned to AT&T Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Cimini’s teachings with those of Dunn. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dunn with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dunn with Fifield for many reasons. For example, Dunn describes the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased.” *See, e.g.,* Dunn at 3:42-43. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Dunn to implement the details of “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit

successfully” taught by Fifield because, it is also directed at communication systems. Fifield at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “alleviat[ing] the problem that certain packets are very difficult to transmit” Fifield at 2:33-34. In addition, a person of ordinary skill in the art would be motivated to combine Dunn with Fifield because (a) Dunn and Fifield disclose similar products, such as communication systems; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Fifields’s teachings with those of Dunn. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dunn with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dunn with Hayashino for many reasons. For example, Dunn describes the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased.” *See, e.g.*, Dunn at 3:42-43. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Dunn to implement the details of “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath” taught by Hayashino because, it is also directed at communication systems. Hayashino at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “transmitting an OFDM signal which causes no waveform distortion in a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave through a multipath, and a transmitter and a receiver

thereof” Hyashino at 3:39-45. In addition, a person of ordinary skill in the art would be motivated to combine Dunn with Hayashino because (a) Dunn and Hayashino disclose similar products, such as communication systems; (b) Hayashino was filed by Panasonic Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hayashino’s teachings with those of Dunn. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dunn with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dunn with Holtzman for many reasons. For example, Dunn describes the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased.” *See, e.g.*, Dunn at 3:42-43. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Dunn to implement the details of “reduc[ing] peak to average power in signals transmitted in a wireless communications system,” taught by Holtzman because, it is also directed at communication systems. Holtzman at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “reducing amplitude and interference in wireless communication systems” Holtzman at 1:12. In addition, a person of ordinary skill in the art would be motivated to combine Dunn with Holtzman because (a) Dunn and Holtzman disclose similar products, such as communication systems; (b) Holtzman was filed by Qualcomm, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a

POSITA would have had a reasonable expectation of success in incorporating Holtzman's teachings with those of Dunn. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dunn with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dunn with Laroia for many reasons. For example, Dunn describes the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased.” *See, e.g.,* Dunn at 3:42-43. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Dunn to implement the details of “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system” taught by Laroia because, it is also directed at communication systems. Laroia at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as lowering peak power. Laroia at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Dunn with Laroia because (a) Dunn and Laroia disclose similar products, such as communication systems; (b) Laroia was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Laroia's teachings with those of Dunn. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dunn with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dunn with Narahashi for many reasons. For example, Dunn describes the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased.” *See, e.g.*, Dunn at 3:42-43. A person having ordinary skill in the art would have been motivated to modify the method and device of Dunn to implement the details of “a signal multiplexer” taught by Narahashi because, it is also directed at “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g.*, Narahashi at [0014]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “signal with a relatively low level of distortion.” *See, e.g.*, Narahashi at [0015]. In addition, a person of ordinary skill in the art would be motivated to combine Dunn with Narahashi because (a) Dunn and Narahashi disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Narahashi’s teachings with those of Dunn. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dunn with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dunn with Stopler for many reasons. For example, Dunn describes the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased.” *See, e.g.*, Dunn at 3:42-43. A person having ordinary skill in the art would have been motivated to modify the method and device of Dunn to implement the details of “method and apparatus for encoding/framing a data stream of multitone modulated signals” taught by Stopler because, it is also directed “to improve impulse burst immunity.” *See, e.g.*, Stopler at 1:9-11. A person of

ordinary skill in the art would be motivated by the advantages of such functionality, such as a “diagonalization scheme [] used to provide immunity against impulse noise, while at the same time allowing for a simple method of utilizing tones of different loading.” *See, e.g.*, Stopler at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Dunn with Stopler because (a) Dunn and Stopler disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Stopler’s teachings with those of Dunn. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dunn with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dunn with Suzuki 406 for many reasons. For example, Dunn describes the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased.” *See, e.g.*, Dunn at 3:42-43. A person having ordinary skill in the art would have been motivated to modify the method and device of Dunn to implement the details of a “receiving method of receiving, demodulating and encoding a signal” taught by Suzuki 406 because, it is also directed “reception of a multicarrier signal in the form of burst data.” *See, e.g.*, Suzuki 406 at 1:8-13. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “suppressed interference of communication of adjacent cells.” *See, e.g.*, Suzuki 406 at 1:56-60. In addition, a person of ordinary skill in the art would be motivated to combine Dunn with Suzuki 406 because (a) Dunn and Suzuki 406 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor

as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 406's teachings with those of Dunn. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dunn with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dunn with Dunn for many reasons. For example, Dunn describes the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased.” *See, e.g.,* Suzuki 416 at 3:42-43. A person having ordinary skill in the art would have been motivated to modify the method and device of Dunn to implement the details of a “communication method and receiving apparatus” taught by Suzuki 416 because, it is also directed toward transmitting “phase-modulated data.” *See, e.g.,* Suzuki 416 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increased transmission capacity.” In addition, a person of ordinary skill in the art would be motivated to combine Dunn with Suzuki 416 because (a) Dunn and Suzuki 416 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 416's teachings with those of Dunn. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dunn with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dunn with Jones for many reasons. For example, Dunn describes the “likelihood of interference at the selected receiver

from other transmitters using the same frequency spectrum [being] materially decreased.” *See, e.g.,* Dunn at 3:42-43. A person having ordinary skill in the art would have been motivated to modify the method and device of Dunn to implement the details of a “[e]fficient request access for OFDM systems” taught by Jones because, it is also directed toward transmitting “for efficient multiplexing of multiple access requests.” *See, e.g.,* Jones at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increase[d] [] number of access requests that may be accommodated within a single burst and/or allows for greater redundancy in transmission of access request data.” In addition, a person of ordinary skill in the art would be motivated to combine Dunn with Jones because (a) Dunn and Jones disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Jones’s teachings with those of Dunn. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dunn with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dunn with Williams for many reasons. For example, Dunn describes the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased.” *See, e.g.,* Dunn at 3:42-43. A person having ordinary skill in the art would have been motivated to modify the method and device of Dunn to implement the details of a “[a] digital transmission system with high immunity to dynamic linear distortion” taught by Williams because, it is also directed toward improved immunity of data. *See, e.g.,* Williams at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as use of “a

modulation system . . . that can maintain control over coefficient values at all frequencies.” In addition, a person of ordinary skill in the art would be motivated to combine Dunn with Williams because (a) Dunn and Williams disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Williams’s teachings with those of Dunn. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dunn with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dunn with Bremer for many reasons. For example, Dunn describes the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased.” *See, e.g.,* Dunn at 3:42-43. A person having ordinary skill in the art would have been motivated to modify the method and device of Dunn to implement the details of a “method and systems for a synchronized pseudo-random privacy modem” taught by Bremer because, it is also directed toward improved transmission of data. *See, e.g.,* Bremer at Title, Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such “increased privacy” in transmitting data. In addition, a person of ordinary skill in the art would be motivated to combine Dunn with Bremer because (a) Dunn and Bremer disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bremer’s teachings with those of Dunn. For similar reasons, a person of

ordinary skill in the art would be motivated to combine Dunn with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

(4) Exemplary Fifield Solution

A person of ordinary skill in the art would be motivated to combine Fifield with Bauml for many reasons. For example, Fifield describes “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully.” *See, e.g.,* Fifield at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Fifield to implement the details of “reducing the signal peak-to-average power ratio of the transmit signal in digital transmission procedures” taught by Bauml because, it is also directed at communication systems. Bauml at 1:5-7. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “definite reduction of signal peaks is achieved with moderate expenditure” Bauml at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Fifield with Bauml because (a) Fifield and Bauml disclose similar products, such as communication systems; (b) Bauml was filed by Telefonaktiebolaget LM Ericsson AB, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bauml’s teachings with those of Fifield. For similar reasons, a person of ordinary skill in the art would be motivated to combine Fifield with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Fifield with Cimini for many reasons. For example, Fifield describes “ensur[ing] that if a packet is difficult to transmit,

because of reduced signal to noise ratio caused by clipping, it will retransmit successfully.” *See, e.g.,* Fifield at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Fifield to implement the details of “reducing the peak to average power ratio (PAP) of a signal with low computational complexity” taught by Cimini because, it is also directed at communication systems. Cimini at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “PAP of an OFDM signal” Cimini at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Fifield with Cimini because (a) Fifield and Cimini disclose similar products, such as communication systems; (b) Cimini is assigned to AT&T Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Cimini’s teachings with those of Fifield. For similar reasons, a person of ordinary skill in the art would be motivated to combine Fifield with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Fifield with Dunn for many reasons. For example, Dunn describes “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully.” *See, e.g.,* Fifield at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Fifield to implement the details of “multitone frequency hop[ping]” taught by Dunn because, it is also directed at communication systems. Dunn at 3:42. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “likelihood of interference at the selected receiver from other transmitters using the

same frequency spectrum [being] materially decreased” Dunn at 1:10-12. In addition, a person of ordinary skill in the art would be motivated to combine Fifield with Dunn because (a) Fifield and Dunn disclose similar products, such as communication systems; (b) Dunn was filed by ITT Manufacturing Enterprises LLC, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dunn’s teachings with those of Fifield. For similar reasons, a person of ordinary skill in the art would be motivated to combine Fifield with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Fifield with Hayashino for many reasons. For example, Fifield describes “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully.” *See, e.g.,* Fifield at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Fifield to implement the details of “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath” taught by Hayashino because, it is also directed at communication systems. Hayashino at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “transmitting an OFDM signal which causes no waveform distortion in a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave through a multipath, and a transmitter and a receiver thereof” Hyashino at 3:39-45. In addition, a person of ordinary skill in the art would be motivated

to combine Fifield with Hayashino because (a) Fifield and Hayashino disclose similar products, such as communication systems; (b) Hayashino was filed by Panasonic Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hayashino's teachings with those of Fifield. For similar reasons, a person of ordinary skill in the art would be motivated to combine Fifield with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Fifield with Holtzman for many reasons. For example, Fifield describes “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully.” *See, e.g.,* Fifield at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Fifield to implement the details of “reduc[ing] peak to average power in signals transmitted in a wireless communications system,” taught by Holtzman because, it is also directed at communication systems. Holtzman at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “reducing amplitude and interference in wireless communication systems” Holtzman at 1:12. In addition, a person of ordinary skill in the art would be motivated to combine Fifield with Holtzman because (a) Fifield and Holtzman disclose similar products, such as communication systems; (b) Holtzman was filed by Qualcomm, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a

POSITA would have had a reasonable expectation of success in incorporating Holtzman's teachings with those of Fifield. For similar reasons, a person of ordinary skill in the art would be motivated to combine Fifield with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Fifield with Laroia for many reasons. For example, Fifield describes “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully.” See, e.g., Fifield at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Fifield to implement the details of “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system” taught by Laroia because, it is also directed at communication systems. Laroia at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as lowering peak power. Laroia at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Fifield with Laroia because (a) Fifield and Laroia disclose similar products, such as communication systems; (b) Laroia was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Laroia's teachings with those of Fifield. For similar reasons, a person of ordinary skill in the art would be motivated to combine Fifield with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Fifield with Narahashi for many reasons. For example, Fifield describes “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully.” *See, e.g.,* Fifield at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Fifield to implement the details of “a signal multiplexer” taught by Narahashi because, it is also directed at “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g.,* Narahashi at [0014]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “signal with a relatively low level of distortion.” *See, e.g.,* Narahashi at [0015]. In addition, a person of ordinary skill in the art would be motivated to combine Fifield with Narahashi because (a) Fifield and Narahashi disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Narahashi’s teachings with those of Fifield. For similar reasons, a person of ordinary skill in the art would be motivated to combine Fifield with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Fifield with Stopler for many reasons. For example, Fifield describes “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully.” *See, e.g.,* Fifield at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Fifield to implement the details of “method and apparatus for encoding/framing a data stream of multitone modulated signals” taught by Stopler because, it is

also directed “to improve impulse burst immunity.” *See, e.g.*, Stopler at 1:9-11. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “diagonalization scheme [] used to provide immunity against impulse noise, while at the same time allowing for a simple method of utilizing tones of different loading.” *See, e.g.*, Stopler at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Fifield with Stopler because (a) Fifield and Stopler disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Stopler’s teachings with those of Fifield. For similar reasons, a person of ordinary skill in the art would be motivated to combine Fifield with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Fifield with Suzuki 406 for many reasons. For example, Fifield describes “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully.” *See, e.g.*, Fifield at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Fifield to implement the details of a “receiving method of receiving, demodulating and encoding a signal” taught by Suzuki 406 because, it is also directed “reception of a multicarrier signal in the form of burst data.” *See, e.g.*, Suzuki 406 at 1:8-13. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “suppressed interference of communication of adjacent cells.” *See, e.g.*, Suzuki 406 at 1:56-60. In addition, a person of ordinary skill in the art would be motivated to combine Fifield with Suzuki 406 because (a) Fifield and Suzuki 406 disclose similar products, such as data

transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 406's teachings with those of Fifield. For similar reasons, a person of ordinary skill in the art would be motivated to combine Fifield with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Fifield with Suzuki 416 for many reasons. For example, Fifield describes “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully.” *See, e.g.*, Fifield at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Fifield to implement the details of a “communication method and receiving apparatus” taught by Suzuki 416 because, it is also directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increased transmission capacity.” In addition, a person of ordinary skill in the art would be motivated to combine Fifield with Suzuki 416 because (a) Fifield and Suzuki 416 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 416's teachings with those of Fifield. For similar reasons, a person of ordinary skill in the art would be motivated to combine Fifield with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Fifield with Jones for many reasons. For example, Fifield describes “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully.” *See, e.g.,* Fifield at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Fifield to implement the details of a “[e]fficient request access for OFDM systems” taught by Jones because, it is also directed toward transmitting “for efficient multiplexing of multiple access requests.” *See, e.g.,* Jones at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increase[d] [] number of access requests that may be accommodated within a single burst and/or allows for greater redundancy in transmission of access request data.” In addition, a person of ordinary skill in the art would be motivated to combine Fifield with Jones because (a) Fifield and Jones disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Jones’s teachings with those of Fifield. For similar reasons, a person of ordinary skill in the art would be motivated to combine Fifield with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Fifield with William for many reasons. For example, Fifield describes “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully.” *See, e.g.,* Fifield at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Fifield to implement the details of a “[a] digital transmission system with high immunity to dynamic linear distortion” taught by Williams because, it is also

directed toward improved immunity of data. *See, e.g., Williams at Abstract.* A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as use of “a modulation system . . . that can maintain control over coefficient values at all frequencies.” In addition, a person of ordinary skill in the art would be motivated to combine Fifield with Williams because (a) Fifield and Williams disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Williams’s teachings with those of Fifield. For similar reasons, a person of ordinary skill in the art would be motivated to combine Fifield with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Fifield with Bremer for many reasons. For example, Fifield describes “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully.” *See, e.g., Fifield at Abstract.* A person having ordinary skill in the art would have been motivated to modify the method and device of Fifield to implement the details of a “method and systems for a synchronized pseudo-random privacy modem” taught by Bremer because, it is also directed toward improved transmission of data. *See, e.g., Bremer at Title, Abstract.* A person of ordinary skill in the art would be motivated by the advantages of such functionality, such “increased privacy” in transmitting data. In addition, a person of ordinary skill in the art would be motivated to combine Fifield with Bremer because (a) Fifield and Bremer disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in

communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bremer's teachings with those of Fifield. For similar reasons, a person of ordinary skill in the art would be motivated to combine Fifield with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

(5) Exemplary Hayashino Solution

A person of ordinary skill in the art would be motivated to combine Hayashino with Bauml for many reasons. For example, Hyashino describes “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath.” *See, e.g.,* Hayashino at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Hayashino to implement the details of “reducing the signal peak-to-average power ratio of the transmit signal in digital transmission procedures” taught by Bauml because, it is also directed at communication systems. Bauml at 1:5-7. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “definite reduction of signal peaks is achieved with moderate expenditure” Bauml at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Hayashino with Bauml because (a) Hayashino and Bauml disclose similar products, such as communication systems; (b) Bauml was filed by Telefonaktiebolaget LM Ericsson AB, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bauml's teachings with those of Hayashino. For similar reasons, a person

of ordinary skill in the art would be motivated to combine Hayashino with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Hayashino with Cimini for many reasons. For example, Hyashino describes “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath.” *See, e.g.,* Hayashino at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Hayashino to implement the details of “reducing the peak to average power ratio (PAP) of a signal with low computational complexity” taught by Cimini because, it is also directed at communication systems. Cimini at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “PAP of an OFDM signal” Cimini at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Hayashino with Cimini because (a) Hayashino and Cimini disclose similar products, such as communication systems; (b) Cimini is assigned to AT&T Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Cimini’s teachings with those of Hayashino. For similar reasons, a person of ordinary skill in the art would be motivated to combine Hayashino with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Hayashino with Dunn for many reasons. For example, Hyashino describes “the OFDM signal [being] transmitted with

no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath.” *See, e.g., Hayashino at Abstract.* A person having ordinary skill in the art would have been motivated to modify the method and/or device of Hayashino to implement the details of “multitone frequency hop[ping]” taught by Dunn because, it is also directed at communication systems. Dunn at 3:42. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased” Dunn at 1:10-12. In addition, a person of ordinary skill in the art would be motivated to combine Hayashino with Dunn because (a) Hayashino and Dunn disclose similar products, such as communication systems; (b) Dunn was filed by ITT Manufacturing Enterprises LLC, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dunn’s teachings with those of Hayashino. For similar reasons, a person of ordinary skill in the art would be motivated to combine Hayashino with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Hayashino with Fifield for many reasons. For example, Hyashino describes “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath.” *See, e.g., Hayashino at Abstract.* A person having ordinary skill in the art would have been motivated to modify the method and/or device of Hayashino to implement the details of “ensur[ing] that if a

packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully” taught by Fifield because, it is also directed at communication systems. Fifield at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “alleviat[ing] the problem that certain packets are very difficult to transmit” Fifield at 2:33-34. In addition, a person of ordinary skill in the art would be motivated to combine Hayashino with Fifield because (a) Hayashino and Fifield disclose similar products, such as communication systems; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Fifield’s teachings with those of Hayashino. For similar reasons, a person of ordinary skill in the art would be motivated to combine Hayashino with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Hayashino with Holtzman for many reasons. For example, Hayashino describes “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath.” *See, e.g.*, Hayashino at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Hayashino to implement the details of “reduc[ing] peak to average power in signals transmitted in a wireless communications system,” taught by Holtzman because, it is also directed at communication systems. Holtzman at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “reducing amplitude and interference in wireless communication systems” Holtzman at 1:12. In addition, a person of ordinary skill in the art would be motivated to combine Hayashino

with Holtzman because (a) Hayashino and Holtzman disclose similar products, such as communication systems; (b) Holtzman was filed by Qualcomm, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Holtzman's teachings with those of Hayashino. For similar reasons, a person of ordinary skill in the art would be motivated to combine Hayashino with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Hayashino with Laroia for many reasons. For example, Hyashino describes “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath.” *See, e.g.,* Hayashino at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Hayashino to implement the details of “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system” taught by Laroia because, it is also directed at communication systems. Laroia at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as lowering peak power. Laroia at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Hayashino with Laroia because (a) Hayashino and Laroia disclose similar products, such as communication systems; (b) Laroia was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor

as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Laroia's teachings with those of Hayashino. For similar reasons, a person of ordinary skill in the art would be motivated to combine Hayashino with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Hayashino with Narahashi for many reasons. For example, Hyashino describes “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath.” *See, e.g.*, Hayashino at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Hayashino to implement the details of “a signal multiplexer” taught by Narahashi because, it is also directed at “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g.*, Narahashi at [0014]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “signal with a relatively low level of distortion.” *See, e.g.*, Narahashi at [0015]. In addition, a person of ordinary skill in the art would be motivated to combine Hayashino with Narahashi because (a) Hayashino and Narahashi disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Narahashi's teachings with those of Hayashino. For similar reasons, a person of ordinary skill in the art would be motivated to combine Hayashino with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Hayashino with Stopler for many reasons. For example, Hyashino describes “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath.” *See, e.g.,* Hayashino at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Hayashino to implement the details of “method and apparatus for encoding/framing a data stream of multitone modulated signals” taught by Stopler because, it is also directed “to improve impulse burst immunity.” *See, e.g.,* Stopler at 1:9-11. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “diagonalization scheme [] used to provide immunity against impulse noise, while at the same time allowing for a simple method of utilizing tones of different loading.” *See, e.g.,* Stopler at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Hayashino with Stopler because (a) Hayashino and Stopler disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Stopler’s teachings with those of Hayashino. For similar reasons, a person of ordinary skill in the art would be motivated to combine Hayashino with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Hayashino with Suzuki 406 for many reasons. For example, Hyashino describes “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath.”

See, e.g., Hayashino at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Hayashino to implement the details of a “receiving method of receiving, demodulating and encoding a signal” taught by Suzuki 406 because, it is also directed “reception of a multicarrier signal in the form of burst data.” *See, e.g.,* Suzuki 406 at 1:8-13. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “suppressed interference of communication of adjacent cells.” *See, e.g.,* Suzuki 406 at 1:56-60. In addition, a person of ordinary skill in the art would be motivated to combine Hayashino with Suzuki 406 because (a) Hayashino and Suzuki 406 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 406’s teachings with those of Hayashino. For similar reasons, a person of ordinary skill in the art would be motivated to combine Hayashino with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Hayashino with Suzuki 416 for many reasons. For example, Hyashino describes “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath.” *See, e.g.,* Hayashino at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Hayashino to implement the details of a “communication method and receiving apparatus” taught by Suzuki 416 because, it is also directed toward transmitting “phase-modulated data.” *See, e.g.,* Suzuki 416 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a

“increased transmission capacity.” In addition, a person of ordinary skill in the art would be motivated to combine Hayashino with Suzuki 416 because (a) Hayashino and Suzuki 416 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 416’s teachings with those of Hayashino. For similar reasons, a person of ordinary skill in the art would be motivated to combine Hayashino with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Hayashino with Jones for many reasons. For example, Hyashino describes “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath.” *See, e.g., Hayashino at Abstract.* A person having ordinary skill in the art would have been motivated to modify the method and device of Hayashino to implement the details of a “[e]fficient request access for OFDM systems” taught by Jones because, it is also directed toward transmitting “for efficient multiplexing of multiple access requests.” *See, e.g., Jones at Abstract.* A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increase[d] [] number of access requests that may be accommodated within a single burst and/or allows for greater redundancy in transmission of access request data.” In addition, a person of ordinary skill in the art would be motivated to combine Hayashino with Jones because (a) Hayashino and Jones disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for

example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Jones's teachings with those of Hayashino. For similar reasons, a person of ordinary skill in the art would be motivated to combine Hayashino with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Hayashino with Williams for many reasons. For example, Hyashino describes “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath.” *See, e.g.*, Hayashino at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Hayashino to implement the details of a “[a] digital transmission system with high immunity to dynamic linear distortion” taught by Williams because, it is also directed toward improved immunity of data. *See, e.g.*, Williams at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as use of “a modulation system . . . that can maintain control over coefficient values at all frequencies.” In addition, a person of ordinary skill in the art would be motivated to combine Hayashino with Williams because (a) Hayashino and Williams disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Williams's teachings with those of Hayashino. For similar reasons, a person of ordinary skill in the art would be motivated to combine Hayashino with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Hayashino with Bremer for many reasons. For example, Hyashino describes “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath.” *See, e.g.,* Hayashino at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Hayashino to implement the details of a “method and systems for a synchronized pseudo-random privacy modem” taught by Bremer because, it is also directed toward improved transmission of data. *See, e.g.,* Bremer at Title, Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such “increased privacy” in transmitting data. In addition, a person of ordinary skill in the art would be motivated to combine Hayashino with Bremer because (a) Hayashino and Bremer disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bremer’s teachings with those of Hayashino. For similar reasons, a person of ordinary skill in the art would be motivated to combine Hayashino with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

(6) Exemplary Holtzman Solution

A person of ordinary skill in the art would be motivated to combine Holtzman with Bauml for many reasons. For example, Holtzman describes “reduc[ing] peak to average power in signals transmitted in a wireless communications system.” *See, e.g.,* Holtzman at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of

Holtzman to implement the details of “reducing the signal peak-to-average power ratio of the transmit signal in digital transmission procedures” taught by Bauml because, it is also directed at communication systems. Bauml at 1:5-7. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “definite reduction of signal peaks is achieved with moderate expenditure” Bauml at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Holtzman with Bauml because (a) Holtzman and Bauml disclose similar products, such as communication systems; (b) Bauml was filed by Telefonaktiebolaget LM Ericsson AB, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bauml’s teachings with those of Holtzman. For similar reasons, a person of ordinary skill in the art would be motivated to combine Holtzman with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Holtzman with Cimini for many reasons. For example, Holtzman describes “reduc[ing] peak to average power in signals transmitted in a wireless communications system.” *See, e.g.*, Holtzman at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Holtzman to implement the details of “reducing the peak to average power ratio (PAP) of a signal with low computational complexity” taught by Cimini because, it is also directed at communication systems. Cimini at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “PAP of an OFDM signal” Cimini at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine

Holtzman with Cimini because (a) Holtzman and Cimini disclose similar products, such as communication systems; (b) Cimini is assigned to AT&T Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Cimini's teachings with those of Holtzman. For similar reasons, a person of ordinary skill in the art would be motivated to combine Holtzman with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Holtzman with Dunn for many reasons. For example, Holtzman describes “reduc[ing] peak to average power in signals transmitted in a wireless communications system.” *See, e.g.*, Holtzman at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Holtzman to implement the details of “multitone frequency hop[ping]” taught by Dunn because, it is also directed at communication systems. Dunn at 3:42. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased” Dunn at 1:10-12. In addition, a person of ordinary skill in the art would be motivated to combine Holtzman with Dunn because (a) Holtzman and Dunn disclose similar products, such as communication systems; (b) Dunn was filed by ITT Manufacturing Enterprises LLC, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dunn's teachings with those

of Holtzman. For similar reasons, a person of ordinary skill in the art would be motivated to combine Holtzman with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Holtzman with Fifield for many reasons. For example, Holtzman describes “reduc[ing] peak to average power in signals transmitted in a wireless communications system.” *See, e.g.*, Holtzman at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Holtzman to implement the details of “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully” taught by Fifield because, it is also directed at communication systems. Fifield at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “alleviat[ing] the problem that certain packets are very difficult to transmit” Fifield at 2:33-34. In addition, a person of ordinary skill in the art would be motivated to combine Holtzman with Fifield because (a) Holtzman and Fifield disclose similar products, such as communication systems; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Fifields’s teachings with those of Holtzman. For similar reasons, a person of ordinary skill in the art would be motivated to combine Holtzman with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Holtzman with Hayashino for many reasons. For example, Holtzman describes “reduc[ing] peak to average power in signals transmitted in a wireless communications system.” *See, e.g.*, Holtzman at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or

device of Holtzman to implement the details of “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath” taught by Hayashino because, it is also directed at communication systems. Hayashino at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “transmitting an OFDM signal which causes no waveform distortion in a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave through a multipath, and a transmitter and a receiver thereof” Hyashino at 3:39-45. In addition, a person of ordinary skill in the art would be motivated to combine Holtzman with Hayashino because (a) Holtzman and Hayashino disclose similar products, such as communication systems; (b) Hayashino was filed by Panasonic Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hayashino’s teachings with those of Holtzman. For similar reasons, a person of ordinary skill in the art would be motivated to combine Holtzman with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Holtzman with Laroia for many reasons. For example, Holtzman describes “reduc[ing] peak to average power in signals transmitted in a wireless communications system.” *See, e.g.*, Holtzman at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Holtzman to implement the details of “decreasing the probability of an unacceptably high peak-

to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system” taught by Laroia because, it is also directed at communication systems. Laroia at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as lowering peak power. Laroia at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Holtzman with Laroia because (a) Holtzman and Laroia disclose similar products, such as communication systems; (b) Laroia was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Laroia’s teachings with those of Holtzman. For similar reasons, a person of ordinary skill in the art would be motivated to combine Holtzman with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Holtzman with Narahashi for many reasons. For example, Holtzman describes “reduc[ing] peak to average power in signals transmitted in a wireless communications system.” *See, e.g.*, Holtzman at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Holtzman to implement the details of “a signal multiplexer” taught by Narahashi because, it is also directed at “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g.*, Narahashi at [0014]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “signal with a relatively low level of distortion.” *See, e.g.*, Narahashi at [0015]. In addition, a person of ordinary skill in the art would be motivated to combine Holtzman with Narahashi because (a) Holtzman and Narahashi disclose similar

products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Narahashi's teachings with those of Holtzman. For similar reasons, a person of ordinary skill in the art would be motivated to combine Holtzman with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Holtzman with Stopler for many reasons. For example, Holtzman describes “reduc[ing] peak to average power in signals transmitted in a wireless communications system.” *See, e.g.*, Holtzman at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Holtzman to implement the details of “method and apparatus for encoding/framing a data stream of multitone modulated signals” taught by Stopler because, it is also directed “to improve impulse burst immunity.” *See, e.g.*, Stopler at 1:9-11. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “diagonalization scheme [] used to provide immunity against impulse noise, while at the same time allowing for a simple method of utilizing tones of different loading.” *See, e.g.*, Stopler at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Holtzman with Stopler because (a) Holtzman and Stopler disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Stopler's teachings with those of Holtzman. For similar reasons, a person of ordinary skill in the art would be motivated to combine

Holtzman with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Holtzman with Suzuki 406 for many reasons. For example, Holtzman describes “reduc[ing] peak to average power in signals transmitted in a wireless communications system.” *See, e.g.*, Holtzman at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Holtzman to implement the details of a “receiving method of receiving, demodulating and encoding a signal” taught by Suzuki 406 because, it is also directed “reception of a multicarrier signal in the form of burst data.” *See, e.g.*, Suzuki 406 at 1:8-13. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “suppressed interference of communication of adjacent cells.” *See, e.g.*, Suzuki 406 at 1:56-60. In addition, a person of ordinary skill in the art would be motivated to combine Holtzman with Suzuki 406 because (a) Holtzman and Suzuki 406 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 406’s teachings with those of Holtzman. For similar reasons, a person of ordinary skill in the art would be motivated to combine Holtzman with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Holtzman with Suzuki 416 for many reasons. For example, Holtzman describes “reduc[ing] peak to average power in signals transmitted in a wireless communications system.” *See, e.g.*, Holtzman at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device

of Holtzman to implement the details of a “communication method and receiving apparatus” taught by Suzuki 416 because, it is also directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increased transmission capacity.” In addition, a person of ordinary skill in the art would be motivated to combine Holtzman with Suzuki 416 because (a) Holtzman and Suzuki 416 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 416’s teachings with those of Holtzman. For similar reasons, a person of ordinary skill in the art would be motivated to combine Holtzman with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Holtzman with Jones for many reasons. For example, Holtzman describes “reduc[ing] peak to average power in signals transmitted in a wireless communications system.” *See, e.g.*, Holtzman at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Holtzman to implement the details of a “[e]fficient request access for OFDM systems” taught by Jones because, it is also directed toward transmitting “for efficient multiplexing of multiple access requests.” *See, e.g.*, Jones at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increase[d] [] number of access requests that may be accommodated within a single burst and/or allows for greater redundancy in transmission of access request data.” In addition, a person of ordinary skill in the art would be motivated to combine Holtzman with Jones because (a) Holtzman and Jones disclose similar products, such as

data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Jones's teachings with those of Holtzman. For similar reasons, a person of ordinary skill in the art would be motivated to combine Holtzman with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Holtzman with Williams for many reasons. For example, Holtzman describes “reduc[ing] peak to average power in signals transmitted in a wireless communications system.” *See, e.g.*, Holtzman at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Holtzman to implement the details of a “[a] digital transmission system with high immunity to dynamic linear distortion” taught by Williams because, it is also directed toward improved immunity of data. *See, e.g.*, Williams at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as use of “a modulation system . . . that can maintain control over coefficient values at all frequencies.” In addition, a person of ordinary skill in the art would be motivated to combine Holtzman with Williams because (a) Holtzman and Williams disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Williams's teachings with those of Holtzman. For similar reasons, a person of ordinary skill in the art would be motivated to combine Holtzman with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Holtzman with Bremer for many reasons. For example, Holtzman describes “reduc[ing] peak to average power in signals transmitted in a wireless communications system.” *See, e.g.*, Holtzman at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Holtzman to implement the details of a “method and systems for a synchronized pseudo-random privacy modem” taught by Bremer because, it is also directed toward improved transmission of data. *See, e.g.*, Bremer at Title, Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such “increased privacy” in transmitting data. In addition, a person of ordinary skill in the art would be motivated to combine Holtzman with Bremer because (a) Holtzman and Bremer disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bremer’s teachings with those of Holtzman. For similar reasons, a person of ordinary skill in the art would be motivated to combine Holtzman with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

(7) Exemplary Laroia Solution

A person of ordinary skill in the art would be motivated to combine Laroia with Bauml for many reasons. For example, Laroia describes “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system.” *See, e.g.*, Laroia at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Laroia to implement the details of “reducing the signal peak-to-average power ratio of the transmit

signal in digital transmission procedures” taught by Bauml because, it is also directed at communication systems. Bauml at 1:5-7. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “definite reduction of signal peaks is achieved with moderate expenditure” Bauml at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Laroia with Bauml because (a) Laroia and Bauml disclose similar products, such as communication systems; (b) Bauml was filed by Telefonaktiebolaget LM Ericsson AB, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bauml’s teachings with those of Laroia. For similar reasons, a person of ordinary skill in the art would be motivated to combine Laroia with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Laroia with Cimini for many reasons. For example, Laroia describes “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system.” *See, e.g.*, Laroia at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Laroia to implement the details of “reducing the peak to average power ratio (PAP) of a signal with low computational complexity” taught by Cimini because, it is also directed at communication systems. Cimini at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “PAP of an OFDM signal” Cimini at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine

Laroia with Cimini because (a) Laroia and Cimini disclose similar products, such as communication systems; (b) Cimini is assigned to AT&T Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Cimini's teachings with those of Laroia. For similar reasons, a person of ordinary skill in the art would be motivated to combine Laroia with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Laroia with Dunn for many reasons. For example, Laroia describes “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system.” *See, e.g.*, Laroia at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Laroia to implement the details of “multitone frequency hop[ping]” taught by Dunn because, it is also directed at communication systems. Dunn at 3:42. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased” Dunn at 1:10-12. In addition, a person of ordinary skill in the art would be motivated to combine Laroia with Dunn because (a) Laroia and Dunn disclose similar products, such as communication systems; (b) Dunn was filed by ITT Manufacturing Enterprises LLC, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had

a reasonable expectation of success in incorporating Dunn’s teachings with those of Laroia. For similar reasons, a person of ordinary skill in the art would be motivated to combine Laroia with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Laroia with Fifield for many reasons. For example, Laroia describes “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system.” *See, e.g.*, Laroia at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Laroia to implement the details of “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully” taught by Fifield because, it is also directed at communication systems. Fifield at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “alleviat[ing] the problem that certain packets are very difficult to transmit” Fifield at 2:33-34. In addition, a person of ordinary skill in the art would be motivated to combine Laroia with Fifield because (a) Laroia and Fifield disclose similar products, such as communication systems; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Fifields’s teachings with those of Laroia. For similar reasons, a person of ordinary skill in the art would be motivated to combine Laroia with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Laroia with Hayashino for many reasons. For example, Laroia describes “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division

Multiplexing (FDM) system, such as a discrete multitone (DMT) system.” *See, e.g.*, Laroia at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Laroia to implement the details of “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath” taught by Hayashino because, it is also directed at communication systems. Hayashino at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “transmitting an OFDM signal which causes no waveform distortion in a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave through a multipath, and a transmitter and a receiver thereof” Hyashino at 3:39-45. In addition, a person of ordinary skill in the art would be motivated to combine Laroia with Hayashino because (a) Laroia and Hayashino disclose similar products, such as communication systems; (b) Hayashino was filed by Panasonic Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hayashino’s teachings with those of Laroia. For similar reasons, a person of ordinary skill in the art would be motivated to combine Laroia with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Laroia with Holtzman for many reasons. For example, Laroia describes “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division

Multiplexing (FDM) system, such as a discrete multitone (DMT) system.” *See, e.g.*, Laroia at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Laroia to implement the details of “reduc[ing] peak to average power in signals transmitted in a wireless communications system,” taught by Holtzman because, it is also directed at communication systems. Holtzman at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “reducing amplitude and interference in wireless communication systems” Holtzman at 1:12. In addition, a person of ordinary skill in the art would be motivated to combine Laroia with Holtzman because (a) Laroia and Holtzman disclose similar products, such as communication systems; (b) Holtzman was filed by Qualcomm, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Holtzman’s teachings with those of Laroia. For similar reasons, a person of ordinary skill in the art would be motivated to combine Laroia with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Laroia with Narahashi for many reasons. For example, Laroia describes “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system.” *See, e.g.*, Laroia at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Laroia to implement the details of “a signal multiplexer” taught by Narahashi because, it is also directed at “prevent[ing] a sharp increase in the peak envelope power of the

multiplexed signal.” *See, e.g.*, Narahashi at [0014]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “signal with a relatively low level of distortion.” *See, e.g.*, Narahashi at [0015]. In addition, a person of ordinary skill in the art would be motivated to combine Laroia with Narahashi because (a) Laroia and Narahashi disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Narahashi’s teachings with those of Laroia. For similar reasons, a person of ordinary skill in the art would be motivated to combine Laroia with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Laroia with Stopler for many reasons. For example, Laroia describes “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system.” *See, e.g.*, Laroia at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Laroia to implement the details of “method and apparatus for encoding/framing a data stream of multitone modulated signals” taught by Stopler because, it is also directed “to improve impulse burst immunity.” *See, e.g.*, Stopler at 1:9-11. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “diagonalization scheme [] used to provide immunity against impulse noise, while at the same time allowing for a simple method of utilizing tones of different loading.” *See, e.g.*, Stopler at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Laroia with Stopler because (a) Laroia and Stopler disclose similar products, such as data transmission in communication systems and (b) both patents

are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Stopler's teachings with those of Laroia. For similar reasons, a person of ordinary skill in the art would be motivated to combine Laroia with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Laroia with Suzuki 406 for many reasons. For example, Laroia describes “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system.” *See, e.g.,* Laroia at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Laroia to implement the details of a “receiving method of receiving, demodulating and encoding a signal” taught by Suzuki 406 because, it is also directed “reception of a multicarrier signal in the form of burst data.” *See, e.g.,* Suzuki 406 at 1:8-13. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “suppressed interference of communication of adjacent cells.” *See, e.g.,* Suzuki 406 at 1:56-60. In addition, a person of ordinary skill in the art would be motivated to combine Laroia with Suzuki 406 because (a) Laroia and Suzuki 406 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 406's teachings with those of Laroia. For similar reasons, a person of ordinary skill in the art would be motivated to combine Laroia with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Laroia with Suzuki 416 for many reasons. For example, Laroia describes “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system.” *See, e.g.*, Laroia at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Laroia to implement the details of a “communication method and receiving apparatus” taught by Suzuki 416 because, it is also directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increased transmission capacity.” In addition, a person of ordinary skill in the art would be motivated to combine Laroia with Suzuki 416 because (a) Laroia and Suzuki 416 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 416’s teachings with those of Laroia. For similar reasons, a person of ordinary skill in the art would be motivated to combine Laroia with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Laroia with Jones for many reasons. For example, Laroia describes “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system.” *See, e.g.*, Laroia at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Laroia to implement the details of a “[e]fficient request access for OFDM systems” taught by Jones

because, it is also directed toward transmitting “for efficient multiplexing of multiple access requests.” *See, e.g.*, Jones at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increase[d] [] number of access requests that may be accommodated within a single burst and/or allows for greater redundancy in transmission of access request data.” In addition, a person of ordinary skill in the art would be motivated to combine Laroia with Jones because (a) Laroia and Jones disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Jones’s teachings with those of Laroia. For similar reasons, a person of ordinary skill in the art would be motivated to combine Laroia with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Laroia with Williams for many reasons. For example, Laroia describes “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system.” *See, e.g.*, Laroia at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Laroia to implement the details of a “[a] digital transmission system with high immunity to dynamic linear distortion” taught by Williams because, it is also directed toward improved immunity of data. *See, e.g.*, Williams at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as use of “a modulation system . . . that can maintain control over coefficient values at all frequencies.” In addition, a person of ordinary skill in the art would be motivated to combine Laroia with Williams because (a) Laroia

and Williams disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Williams's teachings with those of Laroia. For similar reasons, a person of ordinary skill in the art would be motivated to combine Laroia with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Laroia with Bremer for many reasons. For example, Laroia describes “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system.” *See, e.g.*, Laroia at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Laroia to implement the details of a “method and systems for a synchronized pseudo-random privacy modem” taught by Bremer because, it is also directed toward improved transmission of data. *See, e.g.*, Bremer at Title, Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such “increased privacy” in transmitting data. In addition, a person of ordinary skill in the art would be motivated to combine Laroia with Bremer because (a) Laroia and Bremer disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bremer's teachings with those of Laroia. For similar reasons, a person of ordinary

skill in the art would be motivated to combine Laroia with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

(8) Exemplary Narahashi Solution

A person of ordinary skill in the art would be motivated to combine Narahashi with Bauml for many reasons. For example, Narahashi describes “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g., See, e.g.,* Narahashi at [0014]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Narahashi to implement the details of “reducing the signal peak-to-average power ratio of the transmit signal in digital transmission procedures” taught by Bauml because, it is also directed at communication systems. Bauml at 1:5-7. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “definite reduction of signal peaks is achieved with moderate expenditure” Bauml at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Narahashi with Bauml because (a) Narahashi and Bauml disclose similar products, such as communication systems; (b) Bauml was filed by Telefonaktiebolaget LM Ericsson AB, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bauml’s teachings with those of Narahashi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Narahashi with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Narahashi with Cimini for many reasons. For example, Narahashi describes “prevent[ing] a sharp increase in the peak

envelope power of the multiplexed signal.” *See, e.g., See, e.g.,* Narahashi at [0014]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Narahashi to implement the details of “reducing the peak to average power ratio (PAP) of a signal with low computational complexity” taught by Cimini because, it is also directed at communication systems. Cimini at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “PAP of an OFDM signal” Cimini at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Narahashi with Cimini because (a) Narahashi and Cimini disclose similar products, such as communication systems; (b) Cimini is assigned to AT&T Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Cimini’s teachings with those of Narahashi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Narahashi with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Narahashi with Dunn for many reasons. For example, Narahashi describes “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g., See, e.g.,* Narahashi at [0014]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Narahashi to implement the details of “multitone frequency hop[ping]” taught by Dunn because, it is also directed at communication systems. Dunn at 3:42. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being]

materially decreased” Dunn at 1:10-12. In addition, a person of ordinary skill in the art would be motivated to combine Narahashi with Dunn because (a) Narahashi and Dunn disclose similar products, such as communication systems; (b) Dunn was filed by ITT Manufacturing Enterprises LLC, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dunn’s teachings with those of Narahashi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Narahashi with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Narahashi with Fifield for many reasons. For example, Narahashi describes “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g., See, e.g.,* Narahashi at [0014]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Narahashi to implement the details of “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully” taught by Fifield because, it is also directed at communication systems. Fifield at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “alleviat[ing] the problem that certain packets are very difficult to transmit” Fifield at 2:33-34. In addition, a person of ordinary skill in the art would be motivated to combine Narahashi with Fifield because (a) Narahashi and Fifield disclose similar products, such as communication systems; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable

expectation of success in incorporating Fifields's teachings with those of Narahashi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Narahashi with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Narahashi with Hayashino for many reasons. For example, Narahashi describes “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g., See, e.g.,* Narahashi at [0014]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Narahashi to implement the details of “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath” taught by Hayashino because, it is also directed at communication systems. Hayashino at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “transmitting an OFDM signal which causes no waveform distortion in a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave through a multipath, and a transmitter and a receiver thereof” Hyashino at 3:39-45. In addition, a person of ordinary skill in the art would be motivated to combine Narahashi with Hayashino because (a) Narahashi and Hayashino disclose similar products, such as communication systems; (b) Hayashino was filed by Panasonic Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hayashino's teachings with those of Narahashi. For similar reasons, a person of ordinary skill in the art would be motivated to

combine Narahashi with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Narahashi with Holtzman for many reasons. For example, Narahashi describes “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g., See, e.g.,* Narahashi at [0014]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Narahashi to implement the details of “reduc[ing] peak to average power in signals transmitted in a wireless communications system,” taught by Holtzman because, it is also directed at communication systems. Holtzman at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “reducing amplitude and interference in wireless communication systems” Holtzman at 1:12. In addition, a person of ordinary skill in the art would be motivated to combine Narahashi with Holtzman because (a) Narahashi and Holtzman disclose similar products, such as communication systems; (b) Holtzman was filed by Qualcomm, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Holtzman’s teachings with those of Narahashi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Narahashi with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Narahashi with Laroia for many reasons. For example, Narahashi describes “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g., See, e.g.,* Narahashi at [0014]. A person

having ordinary skill in the art would have been motivated to modify the method and/or device of Narahashi to implement the details of “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system” taught by Laroia because, it is also directed at communication systems. Laroia at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as lowering peak power. Laroia at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Narahashi with Laroia because (a) Narahashi and Laroia disclose similar products, such as communication systems; (b) Laroia was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Laroia’s teachings with those of Narahashi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Narahashi with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Narahashi with Stopler for many reasons. For example, Narahashi describes “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g., See, e.g.,* Narahashi at [0014]. A person having ordinary skill in the art would have been motivated to modify the method and device of Narahashi to implement the details of “method and apparatus for encoding/framing a data stream of multitone modulated signals” taught by Stopler because, it is also directed “to improve impulse burst immunity.” *See, e.g.,* Stopler at 1:9-11. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “diagonalization scheme [] used to

provide immunity against impulse noise, while at the same time allowing for a simple method of utilizing tones of different loading.” *See, e.g.*, Stopler at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Narahashi with Stopler because (a) Narahashi and Stopler disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Stopler’s teachings with those of Narahashi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Narahashi with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Narahashi with Suzuki 406 for many reasons. For example, Narahashi describes “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g., See, e.g.*, Narahashi at [0014]. A person having ordinary skill in the art would have been motivated to modify the method and device of Narahashi to implement the details of a “receiving method of receiving, demodulating and encoding a signal” taught by Suzuki 406 because, it is also directed “reception of a multicarrier signal in the form of burst data.” *See, e.g.*, Suzuki 406 at 1:8-13. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “suppressed interference of communication of adjacent cells.” *See, e.g.*, Suzuki 406 at 1:56-60. In addition, a person of ordinary skill in the art would be motivated to combine Narahashi with Suzuki 406 because (a) Narahashi and Suzuki 406 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a

POSITA would have had a reasonable expectation of success in incorporating Suzuki 406's teachings with those of Narahashi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Narahashi with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Narahashi with Suzuki 416 for many reasons. For example, Narahashi describes “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g., See, e.g.,* Narahashi at [0014]. A person having ordinary skill in the art would have been motivated to modify the method and device of Narahashi to implement the details of a “communication method and receiving apparatus” taught by Suzuki 416 because, it is also directed toward transmitting “phase-modulated data.” *See, e.g.,* Suzuki 416 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increased transmission capacity.” In addition, a person of ordinary skill in the art would be motivated to combine Narahashi with Suzuki 416 because (a) Narahashi and Suzuki 416 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 416's teachings with those of Narahashi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Narahashi with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Narahashi with Jones for many reasons. For example, Narahashi describes “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g., See, e.g.,* Narahashi at [0014]. A person

having ordinary skill in the art would have been motivated to modify the method and device of Narahashi to implement the details of a “[e]fficient request access for OFDM systems” taught by Jones because, it is also directed toward transmitting “for efficient multiplexing of multiple access requests.” *See, e.g.*, Jones at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increase[d] [] number of access requests that may be accommodated within a single burst and/or allows for greater redundancy in transmission of access request data.” In addition, a person of ordinary skill in the art would be motivated to combine Narahashi with Jones because (a) Narahashi and Jones disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Jones’s teachings with those of Narahashi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Narahashi with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Narahashi with Williams for many reasons. For example, Narahashi describes “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g.*, *See, e.g.*, Narahashi at [0014]. A person having ordinary skill in the art would have been motivated to modify the method and device of Narahashi to implement the details of a “[a] digital transmission system with high immunity to dynamic linear distortion” taught by Williams because, it is also directed toward improved immunity of data. *See, e.g.*, Williams at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as use of “a modulation system . . . that can maintain control over coefficient values at all frequencies.” In addition, a person of ordinary

skill in the art would be motivated to combine Narahashi with Williams because (a) Narahashi and Williams disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Williams's teachings with those of Narahashi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Narahashi with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Narahashi with Bremer for many reasons. For example, Narahashi describes “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g., See, e.g.,* Narahashi at [0014]. A person having ordinary skill in the art would have been motivated to modify the method and device of Narahashi to implement the details of a “method and systems for a synchronized pseudo-random privacy modem” taught by Bremer because, it is also directed toward improved transmission of data. *See, e.g.,* Bremer at Title, Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such “increased privacy” in transmitting data. In addition, a person of ordinary skill in the art would be motivated to combine Narahashi with Bremer because (a) Narahashi and Bremer disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bremer's teachings with those of Narahashi. For similar reasons, a person of ordinary skill in the art would be

motivated to combine Narahashi with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

(9) Exemplary Stopler Solution

A person of ordinary skill in the art would be motivated to combine Stopler with Bauml for many reasons. For example, Stopler describes “method and apparatus for encoding/framing a data stream of multitone modulated signals” directed “to improve impulse burst immunity.” *See, e.g.,* Stopler at 1:9-11. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Stopler to implement the details of “reducing the signal peak-to-average power ratio of the transmit signal in digital transmission procedures” taught by Bauml because, it is also directed at communication systems. Bauml at 1:5-7. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “definite reduction of signal peaks is achieved with moderate expenditure” Bauml at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Stopler with Bauml because (a) Stopler and Bauml disclose similar products, such as communication systems; (b) Bauml was filed by Telefonaktiebolaget LM Ericsson AB, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bauml’s teachings with those of Stopler. For similar reasons, a person of ordinary skill in the art would be motivated to combine Stopler with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Stopler with Cimini for many reasons. For example, Stopler describes “method and apparatus for encoding/framing a

data stream of multitone modulated signals” directed “to improve impulse burst immunity.” *See, e.g.,* Stopler at 1:9-11. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Stopler to implement the details of “reducing the peak to average power ratio (PAP) of a signal with low computational complexity” taught by Cimini because, it is also directed at communication systems. Cimini at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “PAP of an OFDM signal” Cimini at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Stopler with Cimini because (a) Stopler and Cimini disclose similar products, such as communication systems; (b) Cimini is assigned to AT&T Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Cimini’s teachings with those of Stopler. For similar reasons, a person of ordinary skill in the art would be motivated to combine Stopler with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Stopler with Dunn for many reasons. For example, Stopler describes “method and apparatus for encoding/framing a data stream of multitone modulated signals” directed “to improve impulse burst immunity.” *See, e.g.,* Stopler at 1:9-11. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Stopler to implement the details of “multitone frequency hop[ping]” taught by Dunn because, it is also directed at communication systems. Dunn at 3:42. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the

“likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased” Dunn at 1:10-12. In addition, a person of ordinary skill in the art would be motivated to combine Stopler with Dunn because (a) Stopler and Dunn disclose similar products, such as communication systems; (b) Dunn was filed by ITT Manufacturing Enterprises LLC, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dunn’s teachings with those of Stopler. For similar reasons, a person of ordinary skill in the art would be motivated to combine Stopler with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Stopler with Fifield for many reasons. For example, Stopler describes “method and apparatus for encoding/framing a data stream of multitone modulated signals” directed “to improve impulse burst immunity.” See, *e.g.*, Stopler at 1:9-11. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Stopler to implement the details of “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully” taught by Fifield because, it is also directed at communication systems. Fifield at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “alleviat[ing] the problem that certain packets are very difficult to transmit” Fifield at 2:33-34. In addition, a person of ordinary skill in the art would be motivated to combine Stopler with Fifield because (a) Stopler and Fifield disclose similar products, such as communication systems; and (b) both patents are analogous art and in the same field of endeavor

as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Fifelds's teachings with those of Stopler. For similar reasons, a person of ordinary skill in the art would be motivated to combine Stopler with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Stopler with Hayashino for many reasons. For example, Stopler describes “method and apparatus for encoding/framing a data stream of multitone modulated signals” directed “to improve impulse burst immunity.” *See, e.g.*, Stopler at 1:9-11. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Stopler to implement the details of “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath” taught by Hayashino because, it is also directed at communication systems. Hayashino at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “transmitting an OFDM signal which causes no waveform distortion in a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave through a multipath, and a transmitter and a receiver thereof” Hyashino at 3:39-45. In addition, a person of ordinary skill in the art would be motivated to combine Stopler with Hayashino because (a) Stopler and Hayashino disclose similar products, such as communication systems; (b) Hayashino was filed by Panasonic Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had

a reasonable expectation of success in incorporating Hayashino's teachings with those of Stopler. For similar reasons, a person of ordinary skill in the art would be motivated to combine Stopler with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Stopler with Holtzman for many reasons. For example, Stopler describes "method and apparatus for encoding/framing a data stream of multitone modulated signals" directed "to improve impulse burst immunity." *See, e.g.,* Stopler at 1:9-11. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Stopler to implement the details of "reduc[ing] peak to average power in signals transmitted in a wireless communications system," taught by Holtzman because, it is also directed at communication systems. Holtzman at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "reducing amplitude and interference in wireless communication systems" Holtzman at 1:12. In addition, a person of ordinary skill in the art would be motivated to combine Stopler with Holtzman because (a) Stopler and Holtzman disclose similar products, such as communication systems; (b) Holtzman was filed by Qualcomm, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Holtzman's teachings with those of Stopler. For similar reasons, a person of ordinary skill in the art would be motivated to combine Stopler with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Stopler with Laroia for many reasons. For example, Stopler describes “method and apparatus for encoding/framing a data stream of multitone modulated signals” directed “to improve impulse burst immunity.” *See, e.g.*, Stopler at 1:9-11. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Stopler to implement the details of “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system” taught by Laroia because, it is also directed at communication systems. Laroia at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as lowering peak power. Laroia at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Stopler with Laroia because (a) Stopler and Laroia disclose similar products, such as communication systems; (b) Laroia was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Laroia’s teachings with those of Stopler. For similar reasons, a person of ordinary skill in the art would be motivated to combine Stopler with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Stopler with Narahashi for many reasons. For example, Stopler describes “method and apparatus for encoding/framing a data stream of multitone modulated signals” directed “to improve impulse burst immunity.” *See, e.g.*, Stopler at 1:9-11. A person having ordinary skill in the art would have been motivated to modify the method and device of Stopler to implement the details of “a signal multiplexer” taught

by Narahashi because, it is also directed at “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g.*, Narahashi at [0014]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “signal with a relatively low level of distortion.” *See, e.g.*, Narahashi at [0015]. In addition, a person of ordinary skill in the art would be motivated to combine Stopler with Narahashi because (a) Stopler and Narahashi disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Narahashi’s teachings with those of Stopler. For similar reasons, a person of ordinary skill in the art would be motivated to combine Stopler with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Stopler with Suzuki 406 for many reasons. For example, Stopler describes “method and apparatus for encoding/framing a data stream of multitone modulated signals” directed “to improve impulse burst immunity.” *See, e.g.*, Stopler at 1:9-11. A person having ordinary skill in the art would have been motivated to modify the method and device of Stopler to implement the details of a “receiving method of receiving, demodulating and encoding a signal” taught by Suzuki 406 because, it is also directed “reception of a multicarrier signal in the form of burst data.” *See, e.g.*, Suzuki 406 at 1:8-13. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “suppressed interference of communication of adjacent cells.” *See, e.g.*, Suzuki 406 at 1:56-60. In addition, a person of ordinary skill in the art would be motivated to combine Stopler with Suzuki 406 because (a) Stopler and Suzuki 406 disclose similar products, such as data

transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 406's teachings with those of Stopler. For similar reasons, a person of ordinary skill in the art would be motivated to combine Stopler with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Stopler with Suzuki 416 for many reasons. For example, Stopler describes “method and apparatus for encoding/framing a data stream of multitone modulated signals” directed “to improve impulse burst immunity.” *See, e.g.*, Stopler at 1:9-11. A person having ordinary skill in the art would have been motivated to modify the method and device of Stopler to implement the details of a “communication method and receiving apparatus” taught by Suzuki 416 because, it is also directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increased transmission capacity.” In addition, a person of ordinary skill in the art would be motivated to combine Stopler with Suzuki 416 because (a) Stopler and Suzuki 416 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 416's teachings with those of Stopler. For similar reasons, a person of ordinary skill in the art would be motivated to combine Stopler with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Stopler with Jones for many reasons. For example, Stopler describes “method and apparatus for encoding/framing a data stream of multitone modulated signals” directed “to improve impulse burst immunity.” *See, e.g.*, Stopler at 1:9-11. A person having ordinary skill in the art would have been motivated to modify the method and device of Stopler to implement the details of a “[e]fficient request access for OFDM systems” taught by Jones because, it is also directed toward transmitting “for efficient multiplexing of multiple access requests.” *See, e.g.*, Jones at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increase[d] [] number of access requests that may be accommodated within a single burst and/or allows for greater redundancy in transmission of access request data.” In addition, a person of ordinary skill in the art would be motivated to combine Stopler with Jones because (a) Stopler and Jones disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Jones’s teachings with those of Stopler. For similar reasons, a person of ordinary skill in the art would be motivated to combine Stopler with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Stopler with Williams for many reasons. For example, Stopler describes “method and apparatus for encoding/framing a data stream of multitone modulated signals” directed “to improve impulse burst immunity.” *See, e.g.*, Stopler at 1:9-11. A person having ordinary skill in the art would have been motivated to modify the method and device of Stopler to implement the details of a “[a] digital transmission system with high immunity to dynamic linear distortion” taught by Williams because, it is also

directed toward improved immunity of data. *See, e.g.*, Williams at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as use of “a modulation system . . . that can maintain control over coefficient values at all frequencies.” In addition, a person of ordinary skill in the art would be motivated to combine Stopler with Williams because (a) Stopler and Williams disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Williams’s teachings with those of Stopler. For similar reasons, a person of ordinary skill in the art would be motivated to combine Stopler with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Stopler with Bremer for many reasons. For example, Stopler describes “method and apparatus for encoding/framing a data stream of multitone modulated signals” directed “to improve impulse burst immunity.” *See, e.g.*, Stopler at 1:9-11. A person having ordinary skill in the art would have been motivated to modify the method and device of Stopler to implement the details of a “method and systems for a synchronized pseudo-random privacy modem” taught by Bremer because, it is also directed toward improved transmission of data. *See, e.g.*, Bremer at Title, Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such “increased privacy” in transmitting data. In addition, a person of ordinary skill in the art would be motivated to combine Stopler with Bremer because (a) Stopler and Bremer disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in

communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bremer's teachings with those of Stopler. For similar reasons, a person of ordinary skill in the art would be motivated to combine Stopler with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

(10) Exemplary Suzuki 406 Solution

A person of ordinary skill in the art would be motivated to combine Suzuki 406 with Bauml for many reasons. For example, Suzuki 406 describes "receiving method of receiving, demodulating and encoding a signal." *See, e.g.*, Suzuki 406 at 1:8-13. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Suzuki 406 to implement the details of "reducing the signal peak-to-average power ratio of the transmit signal in digital transmission procedures" taught by Bauml because, it is also directed at communication systems. Bauml at 1:5-7. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "definite reduction of signal peaks is achieved with moderate expenditure" Bauml at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with Bauml because (a) Suzuki 406 and Bauml disclose similar products, such as communication systems; (b) Bauml was filed by Telefonaktiebolaget LM Ericsson AB, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bauml's teachings with those of Suzuki 406. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 406 with Cimini for many reasons. For example, Suzuki 406 describes “receiving method of receiving, demodulating and encoding a signal.” *See, e.g.*, Suzuki 406 at 1:8-13. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Suzuki 406 to implement the details of “reducing the peak to average power ratio (PAP) of a signal with low computational complexity” taught by Cimini because, it is also directed at communication systems. Cimini at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “PAP of an OFDM signal” Cimini at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with Cimini because (a) Suzuki 406 and Cimini disclose similar products, such as communication systems; (b) Cimini is assigned to AT&T Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Cimini’s teachings with those of Suzuki 406. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 406 with Dunn for many reasons. For example, Suzuki 406 describes “receiving method of receiving, demodulating and encoding a signal.” *See, e.g.*, Suzuki 406 at 1:8-13. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Suzuki 406 to implement the details of “multitone frequency hop[ping]” taught by Dunn because, it is also directed at communication systems. Dunn at 3:42. A person of ordinary skill in the art would be

motivated by the advantages of such functionality, such as the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased” Dunn at 1:10-12. In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with Dunn because (a) Suzuki 406 and Dunn disclose similar products, such as communication systems; (b) Dunn was filed by ITT Manufacturing Enterprises LLC, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dunn’s teachings with those of Suzuki 406. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 406 with Fifield for many reasons. For example, Suzuki 406 describes “receiving method of receiving, demodulating and encoding a signal.” *See, e.g.*, Suzuki 406 at 1:8-13. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Suzuki 406 to implement the details of “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully” taught by Fifield because, it is also directed at communication systems. Fifield at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “alleviat[ing] the problem that certain packets are very difficult to transmit” Fifield at 2:33-34. In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with Fifield because (a) Suzuki 406 and Fifield disclose similar products, such as communication systems; and (b) both

patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Fifelds's teachings with those of Suzuki 406. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 406 with Hayashino for many reasons. For example, Suzuki 406 describes “receiving method of receiving, demodulating and encoding a signal.” *See, e.g.*, Suzuki 406 at 1:8-13. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Suzuki 406 to implement the details of “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath” taught by Hayashino because, it is also directed at communication systems. Hayashino at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “transmitting an OFDM signal which causes no waveform distortion in a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave through a multipath, and a transmitter and a receiver thereof” Hyashino at 3:39-45. In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with Hayashino because (a) Suzuki 406 and Hayashino disclose similar products, such as communication systems; (b) Hayashino was filed by Panasonic Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of

success in incorporating Hayashino’s teachings with those of Suzuki 406. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 406 with Holtzman for many reasons. For example, Suzuki 406 describes “receiving method of receiving, demodulating and encoding a signal.” *See, e.g.*, Suzuki 406 at 1:8-13. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Suzuki 406 to implement the details of “reduc[ing] peak to average power in signals transmitted in a wireless communications system,” taught by Holtzman because, it is also directed at communication systems. Holtzman at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “reducing amplitude and interference in wireless communication systems” Holtzman at 1:12. In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with Holtzman because (a) Suzuki 406 and Holtzman disclose similar products, such as communication systems; (b) Holtzman was filed by Qualcomm, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Holtzman’s teachings with those of Suzuki 406. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 406 with Laroia for many reasons. For example, Suzuki 406 describes “receiving method of receiving,

demodulating and encoding a signal.” *See, e.g.*, Suzuki 406 at 1:8-13. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Suzuki 406 to implement the details of “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system” taught by Laroia because, it is also directed at communication systems. Laroia at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as lowering peak power. Laroia at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with Laroia because (a) Suzuki 406 and Laroia disclose similar products, such as communication systems; (b) Laroia was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Laroia’s teachings with those of Suzuki 406. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 406 with Narahashi for many reasons. For example, Suzuki 406 describes “receiving method of receiving, demodulating and encoding a signal.” *See, e.g.*, Suzuki 406 at 1:8-13. A person having ordinary skill in the art would have been motivated to modify the method and device of Suzuki 406 to implement the details of “a signal multiplexer” taught by Narahashi because, it is also directed at “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g.*, Narahashi at [0014]. A person of ordinary skill in the art would be motivated by the advantages of

such functionality, such as the “signal with a relatively low level of distortion.” *See, e.g.*, Narahashi at [0015]. In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with Narahashi because (a) Suzuki 406 and Narahashi disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Narahashi’s teachings with those of Suzuki 406. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 406 with Stopler for many reasons. For example, Suzuki 406 describes “receiving method of receiving, demodulating and encoding a signal.” *See, e.g.*, Suzuki 406 at 1:8-13. A person having ordinary skill in the art would have been motivated to modify the method and device of Suzuki 406 to implement the details of “method and apparatus for encoding/framing a data stream of multitone modulated signals” taught by Stopler because, it is also directed “to improve impulse burst immunity.” *See, e.g.*, Stopler at 1:9-11. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “diagonalization scheme [] used to provide immunity against impulse noise, while at the same time allowing for a simple method of utilizing tones of different loading.” *See, e.g.*, Stopler at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with Stopler because (a) Suzuki 406 and Stopler disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had

a reasonable expectation of success in incorporating Stopler’s teachings with those of Suzuki 406. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 406 with Suzuki 416 for many reasons. For example, Suzuki 406 describes “receiving method of receiving, demodulating and encoding a signal.” *See, e.g.*, Suzuki 406 at 1:8-13. A person having ordinary skill in the art would have been motivated to modify the method and device of Suzuki 406 to implement the details of a “communication method and receiving apparatus” taught by Suzuki 416 because, it is also directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increased transmission capacity.” In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with Suzuki 416 because (a) Suzuki 406 and Suzuki 416 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 416’s teachings with those of Suzuki 406. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 406 with Jones for many reasons. For example, Suzuki 406 describes “receiving method of receiving, demodulating and encoding a signal.” *See, e.g.*, Suzuki 406 at 1:8-13. A person having ordinary

skill in the art would have been motivated to modify the method and device of Suzuki 406 to implement the details of a “[e]fficient request access for OFDM systems” taught by Jones because, it is also directed toward transmitting “for efficient multiplexing of multiple access requests.” *See, e.g.,* Jones at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increase[d] [] number of access requests that may be accommodated within a single burst and/or allows for greater redundancy in transmission of access request data.” In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with Jones because (a) Suzuki 406 and Jones disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Jones’s teachings with those of Suzuki 406. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 406 with Williams for many reasons. For example, Suzuki 406 describes “receiving method of receiving, demodulating and encoding a signal.” *See, e.g.,* Suzuki 406 at 1:8-13. A person having ordinary skill in the art would have been motivated to modify the method and device of Suzuki 406 to implement the details of a “[a] digital transmission system with high immunity to dynamic linear distortion” taught by Williams because, it is also directed toward improved immunity of data. *See, e.g.,* Williams at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as use of “a modulation system . . . that can maintain control over coefficient values at all frequencies.” In addition, a person of ordinary skill in the art would

be motivated to combine Suzuki 406 with Williams because (a) Suzuki 406 and Williams disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Williams's teachings with those of Suzuki 406. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 406 with Bremer for many reasons. For example, Suzuki 406 describes “receiving method of receiving, demodulating and encoding a signal.” *See, e.g.*, Suzuki 406 at 1:8-13. A person having ordinary skill in the art would have been motivated to modify the method and device of Suzuki 406 to implement the details of a “method and systems for a synchronized pseudo-random privacy modem” taught by Bremer because, it is also directed toward improved transmission of data. *See, e.g.*, Bremer at Title, Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such “increased privacy” in transmitting data. In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 406 with Bremer because (a) Suzuki 406 and Bremer disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bremer's teachings with those of Suzuki 406. For similar reasons, a person of ordinary skill in the art would be

motivated to combine Suzuki 406 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

(11) Exemplary Suzuki 416 Solution

A person of ordinary skill in the art would be motivated to combine Suzuki 416 with Bauml for many reasons. For example, Suzuki 416 describes “communication method and receiving apparatus” directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Suzuki 416 to implement the details of “reducing the signal peak-to-average power ratio of the transmit signal in digital transmission procedures” taught by Bauml because, it is also directed at communication systems. Bauml at 1:5-7. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “definite reduction of signal peaks is achieved with moderate expenditure” Bauml at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with Bauml because (a) Suzuki 416 and Bauml disclose similar products, such as communication systems; (b) Bauml was filed by Telefonaktiebolaget LM Ericsson AB, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bauml’s teachings with those of Suzuki 416. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 416 with Cimini for many reasons. For example, Suzuki 416 describes “communication method and receiving apparatus” directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Suzuki 416 to implement the details of “reducing the peak to average power ratio (PAP) of a signal with low computational complexity” taught by Cimini because, it is also directed at communication systems. Cimini at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “PAP of an OFDM signal” Cimini at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with Cimini because (a) Suzuki 416 and Cimini disclose similar products, such as communication systems; (b) Cimini is assigned to AT&T Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Cimini’s teachings with those of Suzuki 416. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 416 with Dunn for many reasons. For example, Suzuki 416 describes “communication method and receiving apparatus” directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Suzuki 416 to implement the details of “multitone frequency hop[ping]” taught by Dunn because, it is also directed at communication systems. Dunn at 3:42. A person of ordinary skill in

the art would be motivated by the advantages of such functionality, such as the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased” Dunn at 1:10-12. In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with Dunn because (a) Suzuki 416 and Dunn disclose similar products, such as communication systems; (b) Dunn was filed by ITT Manufacturing Enterprises LLC, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dunn’s teachings with those of Suzuki 416. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 416 with Fifield for many reasons. For example, Suzuki 416 describes “communication method and receiving apparatus” directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Suzuki 416 to implement the details of “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully” taught by Fifield because, it is also directed at communication systems. Fifield at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “alleviat[ing] the problem that certain packets are very difficult to transmit” Fifield at 2:33-34. In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with Fifield because (a) Suzuki 416 and Fifield disclose similar products, such as communication

systems; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Fifelds's teachings with those of Suzuki 416. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 416 with Hayashino for many reasons. For example, Suzuki 416 describes “communication method and receiving apparatus” directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Suzuki 416 to implement the details of “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath” taught by Hayashino because, it is also directed at communication systems. Hayashino at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “transmitting an OFDM signal which causes no waveform distortion in a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave through a multipath, and a transmitter and a receiver thereof” Hyashino at 3:39-45. In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with Hayashino because (a) Suzuki 416 and Hayashino disclose similar products, such as communication systems; (b) Hayashino was filed by Panasonic Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor

as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hayashino's teachings with those of Suzuki 416. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 416 with Holtzman for many reasons. For example, Suzuki 416 describes "communication method and receiving apparatus" directed toward transmitting "phase-modulated data." *See, e.g.*, Suzuki 416 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Suzuki 416 to implement the details of "reduc[ing] peak to average power in signals transmitted in a wireless communications system," taught by Holtzman because, it is also directed at communication systems. Holtzman at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "reducing amplitude and interference in wireless communication systems" Holtzman at 1:12. In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with Holtzman because (a) Suzuki 416 and Holtzman disclose similar products, such as communication systems; (b) Holtzman was filed by Qualcomm, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Holtzman's teachings with those of Suzuki 416. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 416 with Laroia for many reasons. For example, Suzuki 416 describes “communication method and receiving apparatus” directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Suzuki 416 to implement the details of “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system” taught by Laroia because, it is also directed at communication systems. Laroia at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as lowering peak power. Laroia at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with Laroia because (a) Suzuki 416 and Laroia disclose similar products, such as communication systems; (b) Laroia was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Laroia’s teachings with those of Suzuki 416. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 416 with Narahashi for many reasons. For example, Suzuki 416 describes “communication method and receiving apparatus” directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person having ordinary skill in the art would have been motivated to modify the

method and device of Suzuki 416 to implement the details of “a signal multiplexer” taught by Narahashi because, it is also directed at “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g.*, Narahashi at [0014]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “signal with a relatively low level of distortion.” *See, e.g.*, Narahashi at [0015]. In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with Narahashi because (a) Suzuki 416 and Narahashi disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Narahashi’s teachings with those of Suzuki 416. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 416 with Stopler for many reasons. For example, Suzuki 416 describes “communication method and receiving apparatus” directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Suzuki 416 to implement the details of “method and apparatus for encoding/framing a data stream of multitone modulated signals” taught by Stopler because, it is also directed “to improve impulse burst immunity.” *See, e.g.*, Stopler at 1:9-11. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “diagonalization scheme [] used to provide immunity against impulse noise, while at the same time allowing for a simple method of utilizing tones of different loading.” *See, e.g.*, Stopler at Abstract. In addition, a person

of ordinary skill in the art would be motivated to combine Suzuki 416 with Stopler because (a) Suzuki 416 and Stopler disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Stopler's teachings with those of Suzuki 416. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 416 with Suzuki 406 for many reasons. For example, Suzuki 416 describes “communication method and receiving apparatus” directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Suzuki 416 to implement the details of a “receiving method of receiving, demodulating and encoding a signal” taught by Suzuki 406 because, it is also directed “reception of a multicarrier signal in the form of burst data.” *See, e.g.*, Suzuki 406 at 1:8-13. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “suppressed interference of communication of adjacent cells.” *See, e.g.*, Suzuki 406 at 1:56-60. In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with Suzuki 406 because (a) Suzuki 416 and Suzuki 406 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 406's teachings with those of Suzuki 416. For similar reasons, a person of ordinary skill in the art would

be motivated to combine Suzuki 416 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 416 with Jones for many reasons. For example, Suzuki 416 describes “communication method and receiving apparatus” directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Suzuki 416 to implement the details of a “[e]fficient request access for OFDM systems” taught by Jones because, it is also directed toward “efficient multiplexing of multiple access requests.” *See, e.g.*, Jones at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increase[d] [] number of access requests that may be accommodated within a single burst and/or allows for greater redundancy in transmission of access request data.” In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with Jones because (a) Suzuki 416 and Jones disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Jones’s teachings with those of Suzuki 416. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 416 with Williams for many reasons. For example, Suzuki 416 describes “communication method and receiving apparatus” directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person having ordinary skill in the art would have been motivated to modify the

method and device of Suzuki 416 to implement the details of a “[a] digital transmission system with high immunity to dynamic linear distortion” taught by Williams because, it is also directed toward improved immunity of data. *See, e.g.*, Williams at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as use of “a modulation system . . . that can maintain control over coefficient values at all frequencies.” In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with Williams because (a) Suzuki 416 and Williams disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Williams’s teachings with those of Suzuki 416. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Suzuki 416 with Bremer for many reasons. For example, Suzuki 416 describes “communication method and receiving apparatus” directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Suzuki 416 to implement the details of a “method and systems for a synchronized pseudo-random privacy modem” taught by Bremer because, it is also directed toward improved transmission of data. *See, e.g.*, Bremer at Title, Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such “increased privacy” in transmitting data. In addition, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with Bremer because (a) Suzuki 416 and Bremer disclose similar products, such as

data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bremer's teachings with those of Suzuki 416. For similar reasons, a person of ordinary skill in the art would be motivated to combine Suzuki 416 with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

(12) Exemplary Jones Solution

A person of ordinary skill in the art would be motivated to combine Jones with Bauml for many reasons. For example, Jones describes “[e]fficient request access for OFDM systems” directed toward “efficient multiplexing of multiple access requests.” *See, e.g.*, Jones at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Jones to implement the details of “reducing the signal peak-to-average power ratio of the transmit signal in digital transmission procedures” taught by Bauml because, it is also directed at communication systems. Bauml at 1:5-7. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “definite reduction of signal peaks is achieved with moderate expenditure” Bauml at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Jones with Bauml because (a) Jones and Bauml disclose similar products, such as communication systems; (b) Bauml was filed by Telefonaktiebolaget LM Ericsson AB, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bauml's teachings with those of Jones. For similar reasons, a person of ordinary skill in the art would be motivated

to combine Jones with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Jones with Cimini for many reasons. For example, Jones describes “[e]fficient request access for OFDM systems” directed toward “efficient multiplexing of multiple access requests.” *See, e.g.*, Jones at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Jones to implement the details of “reducing the peak to average power ratio (PAP) of a signal with low computational complexity” taught by Cimini because, it is also directed at communication systems. Cimini at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “PAP of an OFDM signal” Cimini at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Jones with Cimini because (a) Jones and Cimini disclose similar products, such as communication systems; (b) Cimini is assigned to AT&T Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Cimini’s teachings with those of Jones. For similar reasons, a person of ordinary skill in the art would be motivated to combine Jones with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Jones with Dunn for many reasons. For example, Jones describes “[e]fficient request access for OFDM systems” directed toward “efficient multiplexing of multiple access requests.” *See, e.g.*, Jones at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or

device of Jones to implement the details of “multitone frequency hop[ping]” taught by Dunn because, it is also directed at communication systems. Dunn at 3:42. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased” Dunn at 1:10-12. In addition, a person of ordinary skill in the art would be motivated to combine Jones with Dunn because (a) Jones and Dunn disclose similar products, such as communication systems; (b) Dunn was filed by ITT Manufacturing Enterprises LLC, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dunn’s teachings with those of Jones. For similar reasons, a person of ordinary skill in the art would be motivated to combine Jones with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Jones with Fifield for many reasons. For example, Jones describes “[e]fficient request access for OFDM systems” directed toward “efficient multiplexing of multiple access requests.” *See, e.g.*, Jones at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Jones to implement the details of “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully” taught by Fifield because, it is also directed at communication systems. Fifield at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “alleviat[ing] the problem that certain packets are very difficult to transmit” Fifield at 2:33-34. In

addition, a person of ordinary skill in the art would be motivated to combine Jones with Fifeld because (a) Jones and Fifeld disclose similar products, such as communication systems; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Fifelds's teachings with those of Jones. For similar reasons, a person of ordinary skill in the art would be motivated to combine Jones with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Jones with Hayashino for many reasons. For example, Jones describes “[e]fficient request access for OFDM systems” directed toward “efficient multiplexing of multiple access requests.” *See, e.g.*, Jones at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Jones to implement the details of “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath” taught by Hayashino because, it is also directed at communication systems. Hayashino at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “transmitting an OFDM signal which causes no waveform distortion in a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave through a multipath, and a transmitter and a receiver thereof” Hyashino at 3:39-45. In addition, a person of ordinary skill in the art would be motivated to combine Jones with Hayashino because (a) Jones and Hayashino disclose similar products, such as communication systems; (b) Hayashino was filed by Panasonic Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing

products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hayashino's teachings with those of Jones. For similar reasons, a person of ordinary skill in the art would be motivated to combine Jones with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Jones with Holtzman for many reasons. For example, Jones describes “[e]fficient request access for OFDM systems” directed toward “efficient multiplexing of multiple access requests.” *See, e.g.*, Jones at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Jones to implement the details of “reduc[ing] peak to average power in signals transmitted in a wireless communications system,” taught by Holtzman because, it is also directed at communication systems. Holtzman at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “reducing amplitude and interference in wireless communication systems” Holtzman at 1:12. In addition, a person of ordinary skill in the art would be motivated to combine Jones with Holtzman because (a) Jones and Holtzman disclose similar products, such as communication systems; (b) Holtzman was filed by Qualcomm, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Holtzman's teachings with those of Jones. For similar reasons, a person of ordinary skill in the art would be motivated to combine Jones with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Jones with Laroia for many reasons. For example, Jones describes “[e]fficient request access for OFDM systems” directed toward “efficient multiplexing of multiple access requests.” *See, e.g.*, Jones at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Jones to implement the details of “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system” taught by Laroia because, it is also directed at communication systems. Laroia at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as lowering peak power. Laroia at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Jones with Laroia because (a) Jones and Laroia disclose similar products, such as communication systems; (b) Laroia was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Laroia’s teachings with those of Jones. For similar reasons, a person of ordinary skill in the art would be motivated to combine Jones with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Jones with Narahashi for many reasons. For example, Jones describes “[e]fficient request access for OFDM systems” directed toward “efficient multiplexing of multiple access requests.” *See, e.g.*, Jones at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Jones to implement the details of “a signal multiplexer” taught by Narahashi because, it

is also directed at “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g.*, Narahashi at [0014]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “signal with a relatively low level of distortion.” *See, e.g.*, Narahashi at [0015]. In addition, a person of ordinary skill in the art would be motivated to combine Jones with Narahashi because (a) Jones and Narahashi disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Narahashi’s teachings with those of Jones. For similar reasons, a person of ordinary skill in the art would be motivated to combine Jones with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Jones with Stopler for many reasons. For example, Jones describes “[e]fficient request access for OFDM systems” directed toward “efficient multiplexing of multiple access requests.” *See, e.g.*, Jones at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Jones to implement the details of “method and apparatus for encoding/framing a data stream of multitone modulated signals” taught by Stopler because, it is also directed “to improve impulse burst immunity.” *See, e.g.*, Stopler at 1:9-11. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “diagonalization scheme [] used to provide immunity against impulse noise, while at the same time allowing for a simple method of utilizing tones of different loading.” *See, e.g.*, Stopler at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Jones with Stopler because (a) Jones and Stopler disclose similar products, such as data transmission in communication systems and (b)

both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Stopler's teachings with those of Jones. For similar reasons, a person of ordinary skill in the art would be motivated to combine Jones with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Jones with Suzuki 406 for many reasons. For example, Jones describes “[e]fficient request access for OFDM systems” directed toward “efficient multiplexing of multiple access requests.” *See, e.g.*, Jones at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Jones to implement the details of a “receiving method of receiving, demodulating and encoding a signal” taught by Suzuki 406 because, it is also directed “reception of a multicarrier signal in the form of burst data.” *See, e.g.*, Suzuki 406 at 1:8-13. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “suppressed interference of communication of adjacent cells.” *See, e.g.*, Suzuki 406 at 1:56-60. In addition, a person of ordinary skill in the art would be motivated to combine Jones with Suzuki 406 because (a) Jones and Suzuki 406 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 406's teachings with those of Jones. For similar reasons, a person of ordinary skill in the art would be motivated to combine Jones with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Jones with Suzuki 416 for many reasons. For example, Jones describes “[e]fficient request access for OFDM systems” directed toward “efficient multiplexing of multiple access requests.” *See, e.g.*, Jones at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Jones to implement the details of a “communication method and receiving apparatus” taught by Suzuki 416 because, it is also directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increased transmission capacity.” In addition, a person of ordinary skill in the art would be motivated to combine Jones with Suzuki 416 because (a) Jones and Suzuki 416 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 416’s teachings with those of Jones. For similar reasons, a person of ordinary skill in the art would be motivated to combine Jones with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Jones with Williams for many reasons. For example, Jones describes “[e]fficient request access for OFDM systems” directed toward “efficient multiplexing of multiple access requests.” *See, e.g.*, Jones at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Jones to implement the details of a “[a] digital transmission system with high immunity to dynamic linear distortion” taught by Williams because, it is also directed toward improved immunity of data. *See, e.g.*, Williams at Abstract. A person of ordinary skill in the art would be

motivated by the advantages of such functionality, such as use of “a modulation system . . . that can maintain control over coefficient values at all frequencies.” In addition, a person of ordinary skill in the art would be motivated to combine Jones with Williams because (a) Jones and Williams disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Williams’s teachings with those of Jones. For similar reasons, a person of ordinary skill in the art would be motivated to combine Jones with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Jones with Bremer for many reasons. For example, Jones describes “[e]fficient request access for OFDM systems” directed toward “efficient multiplexing of multiple access requests.” *See, e.g.*, Jones at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Jones to implement the details of a “method and systems for a synchronized pseudo-random privacy modem” taught by Bremer because, it is also directed toward improved transmission of data. *See, e.g.*, Bremer at Title, Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such “increased privacy” in transmitting data. In addition, a person of ordinary skill in the art would be motivated to combine Jones with Bremer because (a) Jones and Bremer disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bremer’s teachings with those of Jones. For similar reasons, a person of ordinary

skill in the art would be motivated to combine Jones with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

(13) Exemplary Williams Solution

A person of ordinary skill in the art would be motivated to combine Williams with Bauml for many reasons. For example, Williams describes “[a] digital transmission system with high immunity to dynamic linear distortion” directed toward improved immunity of data. *See, e.g.*, Williams at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Williams to implement the details of “reducing the signal peak-to-average power ratio of the transmit signal in digital transmission procedures” taught by Bauml because, it is also directed at communication systems. Bauml at 1:5-7. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “definite reduction of signal peaks is achieved with moderate expenditure” Bauml at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Williams with Bauml because (a) Williams and Bauml disclose similar products, such as communication systems; (b) Bauml was filed by Telefonaktiebolaget LM Ericsson AB, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bauml’s teachings with those of Williams. For similar reasons, a person of ordinary skill in the art would be motivated to combine Williams with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Williams with Cimini for many reasons. For example, Williams describes “[a] digital transmission system with high

immunity to dynamic linear distortion” directed toward improved immunity of data. *See, e.g.*, Williams at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Williams to implement the details of “reducing the peak to average power ratio (PAP) of a signal with low computational complexity” taught by Cimini because, it is also directed at communication systems. Cimini at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “PAP of an OFDM signal” Cimini at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Williams with Cimini because (a) Williams and Cimini disclose similar products, such as communication systems; (b) Cimini is assigned to AT&T Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Cimini’s teachings with those of Williams. For similar reasons, a person of ordinary skill in the art would be motivated to combine Williams with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Williams with Dunn for many reasons. For example, Williams describes “[a] digital transmission system with high immunity to dynamic linear distortion” directed toward improved immunity of data. *See, e.g.*, Williams at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Williams to implement the details of “multitone frequency hop[ping]” taught by Dunn because, it is also directed at communication systems. Dunn at 3:42. A person of ordinary skill in the art would be motivated by the advantages of such functionality,

such as the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased” Dunn at 1:10-12. In addition, a person of ordinary skill in the art would be motivated to combine Williams with Dunn because (a) Williams and Dunn disclose similar products, such as communication systems; (b) Dunn was filed by ITT Manufacturing Enterprises LLC, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dunn’s teachings with those of Williams. For similar reasons, a person of ordinary skill in the art would be motivated to combine Williams with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Williams with Fifield for many reasons. For example, Williams describes “[a] digital transmission system with high immunity to dynamic linear distortion” directed toward improved immunity of data. *See, e.g.*, Williams at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Williams to implement the details of “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully” taught by Fifield because, it is also directed at communication systems. Fifield at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “alleviat[ing] the problem that certain packets are very difficult to transmit” Fifield at 2:33-34. In addition, a person of ordinary skill in the art would be motivated to combine Williams with Fifield because (a) Williams and Fifield disclose similar products, such as communication systems; and (b) both patents are analogous art and in the same field of endeavor

as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Fifelds's teachings with those of Williams. For similar reasons, a person of ordinary skill in the art would be motivated to combine Williams with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Williams with Hayashino for many reasons. For example, Williams describes “[a] digital transmission system with high immunity to dynamic linear distortion” directed toward improved immunity of data. *See, e.g., Williams at Abstract.* A person having ordinary skill in the art would have been motivated to modify the method and/or device of Williams to implement the details of “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath” taught by Hayashino because, it is also directed at communication systems. Hayashino at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “transmitting an OFDM signal which causes no waveform distortion in a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave through a multipath, and a transmitter and a receiver thereof” Hyashino at 3:39-45. In addition, a person of ordinary skill in the art would be motivated to combine Williams with Hayashino because (a) Williams and Hayashino disclose similar products, such as communication systems; (b) Hayashino was filed by Panasonic Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a

POSITA would have had a reasonable expectation of success in incorporating Hayashino's teachings with those of Williams. For similar reasons, a person of ordinary skill in the art would be motivated to combine Williams with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Williams with Holtzman for many reasons. For example, Williams describes “[a] digital transmission system with high immunity to dynamic linear distortion” directed toward improved immunity of data. *See, e.g.*, Williams at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Williams to implement the details of “reduc[ing] peak to average power in signals transmitted in a wireless communications system,” taught by Holtzman because, it is also directed at communication systems. Holtzman at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “reducing amplitude and interference in wireless communication systems” Holtzman at 1:12. In addition, a person of ordinary skill in the art would be motivated to combine Williams with Holtzman because (a) Williams and Holtzman disclose similar products, such as communication systems; (b) Holtzman was filed by Qualcomm, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Holtzman's teachings with those of Williams. For similar reasons, a person of ordinary skill in the art would be motivated to combine Williams with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Williams with Laroia for many reasons. For example, Williams describes “[a] digital transmission system with high immunity to dynamic linear distortion” directed toward improved immunity of data. *See, e.g.*, Williams at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Williams to implement the details of “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system” taught by Laroia because, it is also directed at communication systems. Laroia at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as lowering peak power. Laroia at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Williams with Laroia because (a) Williams and Laroia disclose similar products, such as communication systems; (b) Laroia was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Laroia’s teachings with those of Williams. For similar reasons, a person of ordinary skill in the art would be motivated to combine Williams with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Williams with Narahashi for many reasons. For example, Williams describes “[a] digital transmission system with high immunity to dynamic linear distortion” directed toward improved immunity of data. *See, e.g.*, Williams at Abstract. A person having ordinary skill in the art would have been motivated to

modify the method and device of Williams to implement the details of “a signal multiplexer” taught by Narahashi because, it is also directed at “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g.*, Narahashi at [0014]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “signal with a relatively low level of distortion.” *See, e.g.*, Narahashi at [0015]. In addition, a person of ordinary skill in the art would be motivated to combine Williams with Narahashi because (a) Williams and Narahashi disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Narahashi’s teachings with those of Williams. For similar reasons, a person of ordinary skill in the art would be motivated to combine Williams with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Williams with Stopler for many reasons. For example, Williams describes “[a] digital transmission system with high immunity to dynamic linear distortion” directed toward improved immunity of data. *See, e.g.*, Williams at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Williams to implement the details of “method and apparatus for encoding/framing a data stream of multitone modulated signals” taught by Stopler because, it is also directed “to improve impulse burst immunity.” *See, e.g.*, Stopler at 1:9-11. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “diagonalization scheme [] used to provide immunity against impulse noise, while at the same time allowing for a simple method of utilizing tones of different loading.” *See, e.g.*, Stopler at Abstract.

In addition, a person of ordinary skill in the art would be motivated to combine Williams with Stopler because (a) Williams and Stopler disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Stopler's teachings with those of Williams. For similar reasons, a person of ordinary skill in the art would be motivated to combine Williams with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Williams with Suzuki 406 for many reasons. For example, Williams describes “[a] digital transmission system with high immunity to dynamic linear distortion” directed toward improved immunity of data. *See, e.g.*, Williams at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Williams to implement the details of a “receiving method of receiving, demodulating and encoding a signal” taught by Suzuki 406 because, it is also directed “reception of a multicarrier signal in the form of burst data.” *See, e.g.*, Suzuki 406 at 1:8-13. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “suppressed interference of communication of adjacent cells.” *See, e.g.*, Suzuki 406 at 1:56-60. In addition, a person of ordinary skill in the art would be motivated to combine Williams with Suzuki 406 because (a) Williams and Suzuki 406 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 406's teachings with those of Williams. For similar reasons, a

person of ordinary skill in the art would be motivated to combine Williams with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Williams with Suzuki 416 for many reasons. For example, Williams describes “[a] digital transmission system with high immunity to dynamic linear distortion” directed toward improved immunity of data. *See, e.g.*, Williams at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Williams to implement the details of a “communication method and receiving apparatus” taught by Suzuki 416 because, it is also directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increased transmission capacity.” In addition, a person of ordinary skill in the art would be motivated to combine Williams with Suzuki 416 because (a) Williams and Suzuki 416 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 416’s teachings with those of Williams. For similar reasons, a person of ordinary skill in the art would be motivated to combine Williams with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Williams with Jones for many reasons. For example, Williams describes “[a] digital transmission system with high immunity to dynamic linear distortion” directed toward improved immunity of data. *See, e.g.*, Williams at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Williams to implement the details of a “[e]fficient request access

for OFDM systems” taught by Jones because, it is also directed toward “efficient multiplexing of multiple access requests.” *See, e.g.*, Jones at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increase[d] [] number of access requests that may be accommodated within a single burst and/or allows for greater redundancy in transmission of access request data.” In addition, a person of ordinary skill in the art would be motivated to combine Williams with Jones because (a) Williams and Jones disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Jones’s teachings with those of Williams. For similar reasons, a person of ordinary skill in the art would be motivated to combine Williams with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Williams with Bremer for many reasons. For example, Williams describes “[a] digital transmission system with high immunity to dynamic linear distortion” directed toward improved immunity of data. *See, e.g.*, Williams at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Williams to implement the details of a “method and systems for a synchronized pseudo-random privacy modem” taught by Bremer because, it is also directed toward improved transmission of data. *See, e.g.*, Bremer at Title, Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such “increased privacy” in transmitting data. In addition, a person of ordinary skill in the art would be motivated to combine Williams with Bremer because (a) Williams and Bremer disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in

the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bremer's teachings with those of Williams. For similar reasons, a person of ordinary skill in the art would be motivated to combine Williams with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

(14) Exemplary Bremer Solution

A person of ordinary skill in the art would be motivated to combine Bremer with Bauml for many reasons. For example, Bremer describes “method and systems for a synchronized pseudo-random privacy modem” directed toward improved transmission of data. *See, e.g.*, Bremer at Title, Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Bremer to implement the details of “reducing the signal peak-to-average power ratio of the transmit signal in digital transmission procedures” taught by Bauml because, it is also directed at communication systems. Bauml at 1:5-7. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “definite reduction of signal peaks is achieved with moderate expenditure” Bauml at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Bremer with Bauml because (a) Bremer and Bauml disclose similar products, such as communication systems; (b) Bauml was filed by Telefonaktiebolaget LM Ericsson AB, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Bauml's teachings with those of Bremer. For similar reasons, a person of ordinary

skill in the art would be motivated to combine Bremer with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bremer with Cimini for many reasons. For example, Bremer describes “method and systems for a synchronized pseudo-random privacy modem” directed toward improved transmission of data. *See, e.g.*, Bremer at Title, Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Bremer to implement the details of “reducing the peak to average power ratio (PAP) of a signal with low computational complexity” taught by Cimini because, it is also directed at communication systems. Cimini at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “PAP of an OFDM signal” Cimini at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Bremer with Cimini because (a) Bremer and Cimini disclose similar products, such as communication systems; (b) Cimini is assigned to AT&T Corporation, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Cimini’s teachings with those of Bremer. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bremer with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bremer with Dunn for many reasons. For example, Bremer describes “method and systems for a synchronized pseudo-random privacy modem” directed toward improved transmission of data. *See, e.g.*, Bremer at Title, Abstract. A person having ordinary skill in the art would have been motivated to modify the

method and/or device of Bremer to implement the details of “multitone frequency hop[ping]” taught by Dunn because, it is also directed at communication systems. Dunn at 3:42. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “likelihood of interference at the selected receiver from other transmitters using the same frequency spectrum [being] materially decreased” Dunn at 1:10-12. In addition, a person of ordinary skill in the art would be motivated to combine Bremer with Dunn because (a) Bremer and Dunn disclose similar products, such as communication systems; (b) Dunn was filed by ITT Manufacturing Enterprises LLC, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dunn’s teachings with those of Bremer. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bremer with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bremer with Fifield for many reasons. For example, Bremer describes “method and systems for a synchronized pseudo-random privacy modem” directed toward improved transmission of data. *See, e.g.*, Bremer at Title, Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Bremer to implement the details of “ensur[ing] that if a packet is difficult to transmit, because of reduced signal to noise ratio caused by clipping, it will retransmit successfully” taught by Fifield because, it is also directed at communication systems. Fifield at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “alleviat[ing] the problem that certain packets are very difficult to

transmit” Fifeld at 2:33-34. In addition, a person of ordinary skill in the art would be motivated to combine Bremer with Fifeld because (a) Bremer and Fifeld disclose similar products, such as communication systems; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Fifelds’s teachings with those of Bremer. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bremer with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bremer with Hayashino for many reasons. For example, Bremer describes “method and systems for a synchronized pseudo-random privacy modem” directed toward improved transmission of data. *See, e.g.*, Bremer at Title, Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Bremer to implement the details of “the OFDM signal [being] transmitted with no waveform distortion on a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave due to a multipath” taught by Hayashino because, it is also directed at communication systems. Hayashino at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “transmitting an OFDM signal which causes no waveform distortion in a data component of each symbol on the frequency axis after Fourier transformation even if a reflected wave is superposed on a direct wave through a multipath, and a transmitter and a receiver thereof” Hyashino at 3:39-45. In addition, a person of ordinary skill in the art would be motivated to combine Bremer with Hayashino because (a) Bremer and Hayashino disclose similar products, such as communication systems; (b) Hayashino was filed by Panasonic Corporation, a leader in

the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hayashino's teachings with those of Bremer. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bremer with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bremer with Holtzman for many reasons. For example, Bremer describes “method and systems for a synchronized pseudo-random privacy modem” directed toward improved transmission of data. *See, e.g.*, Bremer at Title, Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Bremer to implement the details of “reduc[ing] peak to average power in signals transmitted in a wireless communications system,” taught by Holtzman because, it is also directed at communication systems. Holtzman at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “reducing amplitude and interference in wireless communication systems” Holtzman at 1:12. In addition, a person of ordinary skill in the art would be motivated to combine Bremer with Holtzman because (a) Bremer and Holtzman disclose similar products, such as communication systems; (b) Holtzman was filed by Qualcomm, a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Holtzman's teachings with those of Bremer. For similar reasons, a person of ordinary skill in the art would be

motivated to combine Bremer with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bremer with Laroia for many reasons. For example, Bremer describes “method and systems for a synchronized pseudo-random privacy modem” directed toward improved transmission of data. *See, e.g.*, Bremer at Title, Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Bremer to implement the details of “decreasing the probability of an unacceptably high peak-to-average power ratio in a signal to be transmitted by a Frequency Division Multiplexing (FDM) system, such as a discrete multitone (DMT) system” taught by Laroia because, it is also directed at communication systems. Laroia at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as lowering peak power. Laroia at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Bremer with Laroia because (a) Bremer and Laroia disclose similar products, such as communication systems; (b) Laroia was filed by Lucent Technologies Inc., a leader in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Laroia’s teachings with those of Bremer. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bremer with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bremer with Narahashi for many reasons. For example, Bremer describes “method and systems for a synchronized pseudo-

random privacy modem” directed toward improved transmission of data. *See, e.g.*, Bremer at Title, Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Bremer to implement the details of “a signal multiplexer” taught by Narahashi because, it is also directed at “prevent[ing] a sharp increase in the peak envelope power of the multiplexed signal.” *See, e.g.*, Narahashi at [0014]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “signal with a relatively low level of distortion.” *See, e.g.*, Narahashi at [0015]. In addition, a person of ordinary skill in the art would be motivated to combine Bremer with Narahashi because (a) Bremer and Narahashi disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Narahashi’s teachings with those of Bremer. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bremer with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bremer with Stopler for many reasons. For example, Bremer describes “method and systems for a synchronized pseudo-random privacy modem” directed toward improved transmission of data. *See, e.g.*, Bremer at Title, Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Bremer to implement the details of “method and apparatus for encoding/framing a data stream of multitone modulated signals” taught by Stopler because, it is also directed “to improve impulse burst immunity.” *See, e.g.*, Stopler at 1:9-11. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a

“diagonalization scheme [] used to provide immunity against impulse noise, while at the same time allowing for a simple method of utilizing tones of different loading.” *See, e.g.*, Stopler at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Bremer with Stopler because (a) Bremer and Stopler disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Stopler’s teachings with those of Bremer. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bremer with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bremer with Suzuki 406 for many reasons. For example, Bremer describes “method and systems for a synchronized pseudo-random privacy modem” directed toward improved transmission of data. *See, e.g.*, Bremer at Title, Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Bremer to implement the details of a “receiving method of receiving, demodulating and encoding a signal” taught by Suzuki 406 because, it is also directed “reception of a multicarrier signal in the form of burst data.” *See, e.g.*, Suzuki 406 at 1:8-13. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “suppressed interference of communication of adjacent cells.” *See, e.g.*, Suzuki 406 at 1:56-60. In addition, a person of ordinary skill in the art would be motivated to combine Bremer with Suzuki 406 because (a) Bremer and Suzuki 406 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications

systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 406's teachings with those of Bremer. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bremer with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bremer with Suzuki 416 for many reasons. For example, Bremer describes “method and systems for a synchronized pseudo-random privacy modem” directed toward improved transmission of data. *See, e.g.*, Bremer at Title, Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Bremer to implement the details of a “communication method and receiving apparatus” taught by Suzuki 416 because, it is also directed toward transmitting “phase-modulated data.” *See, e.g.*, Suzuki 416 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increased transmission capacity.” In addition, a person of ordinary skill in the art would be motivated to combine Bremer with Suzuki 416 because (a) Bremer and Suzuki 416 disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Suzuki 416's teachings with those of Bremer. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bremer with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bremer with Jones for many reasons. For example, Bremer describes “method and systems for a synchronized pseudo-random privacy modem” directed toward improved transmission of data. *See, e.g.*, Bremer at Title,

Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Bremer to implement the details of a “[e]fficient request access for OFDM systems” taught by Jones because, it is also directed toward “efficient multiplexing of multiple access requests.” *See, e.g.,* Jones at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as a “increase[d] [] number of access requests that may be accommodated within a single burst and/or allows for greater redundancy in transmission of access request data.” In addition, a person of ordinary skill in the art would be motivated to combine Bremer with Jones because (a) Bremer and Jones disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Jones’s teachings with those of Bremer. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bremer with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Bremer with Williams for many reasons. For example, Bremer describes “method and systems for a synchronized pseudo-random privacy modem” directed toward improved transmission of data. *See, e.g.,* Bremer at Title, Abstract. A person having ordinary skill in the art would have been motivated to modify the method and device of Bremer to implement the details of a “[a] digital transmission system with high immunity to dynamic linear distortion” taught by Williams because, it is also directed toward improved immunity of data. *See, e.g.,* Williams at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as use of “a modulation system . . . that can maintain control over coefficient values at all frequencies.” In addition, a person of

ordinary skill in the art would be motivated to combine Bremer with Williams because (a) Bremer and Williams disclose similar products, such as data transmission in communication systems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved transmission of data in communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Williams's teachings with those of Bremer. For similar reasons, a person of ordinary skill in the art would be motivated to combine Bremer with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

(15) Exemplary Obviousness Reference Solutions

A person of ordinary skill in the art would be motivated to combine Bauml, Cimini, Dunn, Fifield, Hayashino, Holtzman, Laroia, Narahashi, Stopler, Suzuki 406, Suzuki 416, Jones, Williams, and Bremer (the "Primary References") with the Secondary References for many reasons. As described above, each of the primary references teach multicarrier communication systems, devices, or methods. *See* Sections V.B.3.c(1)-(14). A person having ordinary skill in the art would have been motivated to modify the method of the Primary References to implement the details of the Secondary References because they are also directed at multicarrier communication systems, devices, or methods. For example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of random number generator. Suzuki 415 at Abstract. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of "a receiving device makes the data conducted a high precision maximum likelihood sequence estimation and after transmission it can be restored with further improved accuracy." Sakoda at Abstract. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of an

adaptive transmission system for use in a network. Hwang at 1:6-8. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of system that eliminates cross-talk. Shively at Abstract. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use single analog transmission line wherein information carried by more than one analog signal is multiplexed. Kaku at [0007]. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of data scramblers. AAPA-1 at 1. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “lower[ing] the peak-to-average power ratio (PAR) of transmitted signals.” AAPA-2 at 1:20-22. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of alternative ways of reducing PAR in DMT systems. Djokovic at 1. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as ensuring the proper interfacing and interworking of ADSL transmission units. T1.413-1998 at xi. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of a standard for interfacing between telecommunications networks and a customer. T1.413-1995 at 1.1. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the transmit power. T1E1.4/98-194 at 1.

In addition, a person of ordinary skill in the art would be motivated to combine any Primary Reference with and Secondary reference because (a) each reference discloses similar products, such as multicarrier communication systems and (b) the references are analogous art and in the same field of endeavor as each other, for example, both relate to communication systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the

Secondary References’ teachings with those of the Primary References. For similar reasons, a person of ordinary skill in the art would be motivated to combine the Primary References with other references in Exhibits F4-008A – F4-008N and F4 Secondary-008 with similar teachings.

d) The Claims Recite Well-Known Concepts That Would Have Been Obvious to Implement.

The Asserted Claims represent nothing more than an arrangement of well-known concepts and features and add nothing to the state of the art at the time of the alleged invention. For each of the concepts represented by the Asserted Claims, it would have been obvious to add to the teachings of any number of known products and references, including to the teachings of any of the primary references in Exhibits F4-008A – F4-008N and F4 Secondary-008 to the extent that such reference is alleged to be missing such concept or feature. The following are examples of concepts that would have been obvious, which is not intended to be an exhaustive list of the claimed features that would have been obvious. Nokia Defendants reserve the right to supplement these examples as necessary.

- (1) It would have been obvious to modify any primary reference for a “associating each carrier signal with a value determined independently of any bit value of the bit stream carried by that respective carrier signal, the value associated with each carrier signal determined using a pseudo-random number generator”

To the extent TQ Delta contends that any reference charted in Exhibits F4-008A – F4-008N and F4 Secondary-008 does not disclose “associating each carrier signal with a value determined independently of any bit value of the bit stream carried by that respective carrier signal, the value associated with each carrier signal determined using a pseudo-random number generator” it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F4-008A – F4-008N and F4 Secondary-008. A person having ordinary skill in

the art would have been motivated to employ or implement that feature. *See* Suzuki 415 at 3:35-64. A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See* Sakoda at 5:61-6:13. A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See* S Kaku at [0038]-[0040]. Associating each carrier signal with a value determined independently of any bit value of the bit stream carried by that respective carrier signal, the value associated with each carrier signal determined using a pseudo-random number generator would have accomplished reduced PAR. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(2) It would have been obvious to modify any primary reference to include “computing a phase shift for each carrier signal based on the value associated with that carrier signal” in any configuration.

To the extent TQ Delta contends that any reference charted in Exhibits F4-008A – F4-008N and F4 Secondary-008 does not disclose “computing a phase shift for each carrier signal based on the value associated with that carrier signal” it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F4-008A – F4-008N and F4 Secondary-008. A person having ordinary skill in the art would have been motivated to employ or implement that feature. *See* Suzuki 415 at 3:35-64. A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See* Sakoda at 5:61-6:13. A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See* See, Kaku at [0039]. A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See* Dijkovic at 2 at [0039]. Computing a phase shift for each

carrier signal based on the value associated with that carrier signal would have accomplished reduced PAR. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

e) Additional Reasons to Combine.

In addition to the information contained elsewhere in these invalidity contentions, including in Exhibits F4-008A – F4-008N and F4 Secondary-008, Nokia Defendants have identified additional motivations and reasons to combine the various references. Nokia Defendants note that in *KSR Int’l Co. v. Teleflex Inc.*, the Supreme Court held that “[i]n determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. What matters is the objective reach of the claim. If the claim extends to what is obvious, it is invalid under § 103.” 127 S. Ct. 1727, 1742 (2007).

KSR further illustrated several ways in which the subject matter of a patent claim may be shown to have been obvious. For instance, “[o]ne of the ways in which a patent’s subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent’s claims.” *KSR*, 127 S. Ct. at 1742. The Supreme Court held that it was error to “look only to the problem the patentee was trying to solve.” *Id.* As the Court explained, “[t]he question is not whether the combination was obvious to the patentee but whether the combination was obvious to a person with ordinary skill in the art. Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *Id.* Further, “[c]ommon sense teaches ... that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to

fit the teachings of multiple patents together like pieces of a puzzle.” *Id.* Further, a showing that a combination of elements was “obvious to try” may demonstrate that it was obvious under § 103. *Id.* For instance, the Supreme Court held that “predictable solutions” using a combination of “known options” may render the subject matter of a patent claim obvious. *Id.*

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product was not of innovation but of ordinary skill and common sense. *Id.* The ways in which the subject matter of a patent claim may be shown to be obvious, identified by *KSR*, are merely illustrative. A core thrust of *KSR* was that “[r]igid preventative rules that deny factfinders recourse to common sense are neither necessary under our case law nor consistent with it.” *KSR*, 127 S. Ct. at 1742-43 (quoting *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1367 (Fed. Cir. 2006) (“Our suggestion test is in actuality quite flexible and not only permits, but requires, consideration of common knowledge and common sense”), and *Alza Corp. v. Mylan Labs., Inc.*, 464 F.3d 1286, 1291 (Fed. Cir. 2006) (“There is flexibility in our obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires an actual teaching to combine ...”).

Although Nokia Defendants note that there is no longer a rigid requirement regarding motivation to combine under *KSR*, Nokia Defendants provide the following statements regarding motivation to combine. Multiple teachings, suggestions, and/or reasons to modify any of the references and/or to combine any two or more of the references in Exhibits F4-008A – F4-008N and F4 Secondary-008 come from many sources, including the prior art (specific and as a whole), common knowledge, common sense, predictability, expectations, industry trends, design

incentives or need, market demands or pressure, market forces, obvious to try, the nature of the problem faced, and/or knowledge possessed by one of ordinary skill. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one.

The combination of prior art references identified in these contentions would have been obvious because the combination represents the known potential options with a reasonable expectation of success. Additionally, one of ordinary skill in the art would have been motivated to create combinations identified in these contentions using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or teaching, suggestion, or motivation in the prior art generally. Also, market forces in the industry, and the desire to improve features and performance, would motivate the addition of features to systems as they became available, became less expensive, became more commonly used, provided better performance, reduced costs, size or weight, or predictably achieved other desirable results.

C. Other Grounds for Invalidity

Nokia Defendants identify the following additional grounds for invalidity of the Asserted Claim of the Family 4 Patent. Nokia Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

1. Invalidity of the Family 4 Patent Based on 35 U.S.C. § 112, ¶ 1 (Enablement and Written Description)

Based on Nokia Defendants' present understanding of TQ Delta's asserted scope of the claims of the Family 4 Patent, to the extent such positions can be understood from TQ Delta's

Preliminary Infringement Contentions, the Asserted Claim of the Family 4 Patent is invalid for reciting at least the following claim terms, phrases, or limitations that lack enablement or sufficient written description:

- “a multicarrier system including a first transceiver that uses a plurality of carrier signals” (Claim 14)
- “combining the phase shift computed for each respective carrier signal with the phase characteristic of that carrier signal to substantially scramble the phase characteristics of the plurality of carrier signals” (Claim 14)
- “wherein multiple carrier signals corresponding to the scrambled carrier signals are used by the first transceiver to module the same bit value” (Claim 14)

These claim terms, phrases, and limitations, as apparently construed by TQ Delta, fail to satisfy the enablement and/or written description requirements of 35 U.S.C. § 112. This is at least because the specification of the Family 4 Patent demonstrates that the patentee neither conceived of nor demonstrated possession of all that TQ Delta now contends the claims cover. In addition, based on Defendant’s present understanding of TQ Delta’s Preliminary Infringement Contentions, the Asserted Claim of the Family 4 Patent in which these claim terms, phrases, and limitations appear is invalid because the specification fails to provide sufficient disclosure to enable a person of ordinary skill in the art to which the alleged invention pertains, or with which it is most nearly connected, to implement the alleged invention without undue experimentation.

2. Invalidity of the Family 4 Patent Based on 35 U.S.C. § 112, ¶ 2 (Indefiniteness)

Based on Nokia Defendants’ present understanding of TQ Delta’s asserted scope of the claim of the Family 4 Patent, to the extent such positions can be understood from TQ Delta’s Preliminary Infringement Contentions, Nokia Defendants assert that the Asserted Claim of the Family 4 Patent is invalid for reciting at least the following indefinite claim terms, phrases, or limitations:

- “substantially scramble the phase characteristics of the plurality of carrier signals” (Claim 14)
- “multiple carrier signals corresponding to the scrambled carrier signals are used by the first transceiver to module the same bit value” (Claim 14)

These claim terms, phrases, and limitations, as apparently construed by TQ Delta, violate the definiteness requirements of 35 U.S.C. § 112.

Based on Nokia Defendants’ present understanding of TQ Delta’s Preliminary Infringement Contentions, these claim terms, phrases, and limitations are indefinite because they are inconsistent with and broader than the alleged invention disclosed in the specification and during prosecution. And given TQ Delta’s apparent constructions of the claim terms, phrases, and limitations, persons of ordinary skill in the art at the time of the invention would not have understood what is claimed with reasonable certainty, even when the claims are read in light of the specification and prosecution history.

3. Additional Grounds for Invalidity of the Family 4 Patents

In addition to the preceding invalidity contentions, Nokia Defendants reserve the right to assert that the Asserted Claims are invalid under 35 U.S.C. § 102(f) and/or § 102(g) in the event that Nokia Defendants obtain evidence that the named inventor of the Family 4 Patents did not invent (either alone or in conjunction with other parties) the subject matter claimed in the Family 4 Patents. Should Nokia Defendants obtain such evidence, Nokia Defendants will provide the name of the person(s) from whom and the circumstances under which the invention or any part of it was derived, and/or the circumstances surrounding the making of the invention before the patent application.

VI. THE ASSERTED FAMILY 6 PATENTS ARE INVALID.

A. Identification of Prior Art

Nokia Defendants contend that the prior art references described and charted in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 anticipate and/or render obvious, alone or in combination, one or more of the Asserted Claims of the Family 6 Patents.

B. The Asserted Claims Are Anticipated and/or Rendered Obvious.

TQ Delta asserts claims 8, 9, and 11 of U.S. Patent No. 8,594,162 and claims 8, 10, 11, 12, and 14 of U.S. Patent No. 10,567,112 (collectively, the “Family 6 Patents”) against Nokia Defendants in this lawsuit. These claims are invalid because the Family 6 Patents fails to meet one or more of the requirements for patentability. The individual bases for invalidity are provided below and in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112. Each of the prior art references, the underlying work, and/or the underlying apparatus or method qualifies as prior art under one or more sections of 35 U.S.C. §§ 102 and/or 103.

In an effort to focus the issues, Nokia Defendants have cited representative portions of identified references, even where a reference may contain additional disclosures or support for a particular claim element. Each and every disclosure of the same limitation in the same reference is not necessarily identified. In addition, persons of ordinary skill in the art generally read a prior art reference as a whole and in the context of other publications and literature and in the context of their knowledge as persons of ordinary skill in the art. Thus, to understand and interpret any specific statement or disclosure within a prior art reference, such persons would rely on other information within the reference, along with other publications and their general scientific

knowledge and experience in the field. Thus, each prior art reference identified herein should be understood in the context of the reference itself, in conjunction with anything incorporated by reference or described as relevant technology by the reference, any documents that are referred to for further understanding by the reference, any system embodying the reference, and any testimony by those with knowledge of the reference, such as the named authors and inventors. Nokia Defendants may rely on uncited portions of the prior art references and on other publications and expert testimony to provide context, and as aids to understanding and interpreting the portions that are cited. Nokia Defendants may also rely on uncited portions of the prior art references, other disclosed publications, and the testimony of experts to establish that a person of ordinary skill in the art would have been motivated to modify or combine certain of the cited references so as to render the claims obvious.

1. The Family 6 Patent Priority Date.

TQ Delta's Preliminary Infringement Contentions allege that the Asserted Claims of the Family 6 Patents are entitled at least to the priority date March 3, 2004 or, in the alternative, March 24, 2004 or, in the alternative, March 3, 2005 or, in the alternative, April 28, 2010 or, in the alternative, June 11, 2013. To the extent TQ Delta alleges that any prior art relied on in these invalidity contentions does not qualify as prior art to an Asserted Patent, Nokia Defendants reserve the right to rebut those allegations (*e.g.*, by demonstrating an earlier relevant date for the challenged prior art and/or a later priority date for the Asserted Patent and/or Asserted Claim).

2. The Family 6 Patents Are Anticipated and/or Rendered Obvious by the Prior Art.

Some or all of the Asserted Claims of the Family 6 Patents are invalid as anticipated and/or rendered obvious under 35 U.S.C. §§ 102 and/or 103 in view of each of the primary prior art references identified in the claim charts included in Exhibits F6-162A – F6-162E, F6-112A – F6-

112E, which identify specific examples of where each limitation of the Asserted Claims is found in the prior art references. As explained above, the cited portions of prior art references identified in the attached claim charts are exemplary in nature and representative of the content and teaching of the prior art references, and should be understood in the context of the reference as a whole and as they would be understood by a person of ordinary skill in the art.

Nokia Defendants identify the following references as anticipating and/or rendering obvious one or more of the Asserted Claims of the Family 6 Patents under 35 U.S.C. §§ 102 and/or 103. The table of anticipating and/or rendering obvious references below is exemplary, and it does not constitute an admission that any reference not listed below does not also anticipate and/or render obvious the claims of the Family 6 Patents. Further, Nokia Defendants contend that any prior art reference in the attached charts that is charted for each limitation of any given claim, anticipates that claim, regardless of whether that prior art reference is listed in the following table.

Exhibits	Primary Prior Art	Date⁴
F6-162A F6-112A	ITU-T Recommendation G.992.1 (“G.992.1”)	June 1999
F6-162B F6-112B	ITU-T Recommendation G.992.3 (“G.992.3”)	July 2002
F6-162C F6-112C	U.S. Patent No. 7,428,669 to Cioffi (“Cioffi”)	December 7, 2003
F6-162D F6-112D	Temporary Document SC-060 titled “G.gen, G.dmt, G.lite.bis: Protocol for On-Line Reconfiguration of ADSL” (“SC-060”)	August 6-10, 2001

⁴ Nokia Defendants reserve the right to identify additional bases for qualification as prior art for each of the identified references in the event that it is determined that the Asserted Patents are not entitled to the claimed priority date.

Exhibits	Primary Prior Art	Date ⁴
F6-162E F6-112E	U.S. Patent Pub. No. US2002/0080867 to Abbas et al. (“Abbas”)	September 25, 2001

To the extent any item of prior art cited above is deemed not to disclose and/or render obvious, explicitly or inherently, any limitation of an Asserted Claim of the Family 6 Patents, Nokia Defendants reserve the right to argue that any difference between that prior art and the corresponding patent claim would have been either inherent in the art or obvious to a person of ordinary skill in the art, even if Nokia Defendants have not specifically denoted that the art is to be combined with the knowledge of a person of ordinary skill in the art.

3. The Family 6 Patents Are Obvious Over the Prior Art.

To the extent TQ Delta argues that any limitation of the Asserted Claims of the Family 6 Patents are not explicitly disclosed and/or rendered obvious by an item of prior art identified above and in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112, any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. The item of prior art would, therefore, render such claims invalid as obvious under 35 U.S.C. § 103.

a) The Claims Are Obvious Over the Primary References in Light of One or More Secondary References.

To the extent the foregoing references are found not to anticipate and/or render obvious the Asserted Claims of the Family 6 Patents, the foregoing references render the Asserted Claims obvious, either alone or in combination with one or more of the other references identified above. One of ordinary skill in the art would have been motivated to combine the various references cited

above and herein so as to disclose each and every limitation of the Asserted Claims of the Family 6 Patents.

Prior art references rendering the Asserted Claims of the Family 6 Patents obvious, either alone or in combination with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112, are provided in the tables above and below and in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112. The prior art identified in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and render one or more asserted claims of the Family 6 Patents obvious when the references are read in combination with one or more of each other, when read in combination with any of the prior art identified in Exhibits F6 Secondary - 162, F6 Secondary - 112, and/or when read in view of the state of the art and knowledge of those skilled in the art.

Obviousness Reference	Date
U.S. Patent No. 5,699,365 to Klayman et al. (“Klayman”)	March 27, 1996
U.S. Patent No. 6,700,881 to Kong et al. (“Kong”)	March 1, 1999
U.S. Patent Pub. No. US2003/0174764 to Mahany (“Mahany”)	February 6, 2003
U.S. Patent Pub. No. US2002/0172188 to Wunsch (“Wunsch”)	May 19, 2001
JP2000/216758A to Kazawa et al. (“JP 758”)	August 4, 2000
U.S. Patent Pub. No. US2003/0026282 A1 to Gross et al. (“Gross”)	October 9, 1998

Obviousness Reference	Date
U.S. Patent No. 6,522,666 to Tzannes et al. (“Tzannes”)	June 26, 1998

To the extent TQ Delta argues that any Asserted Claim of the Family 6 Patents is not disclosed or rendered obvious by any Exhibits F6-162A – F6-162E, F6-112A – F6-112E reference, the Asserted Claims nevertheless would have been obvious in light of one or more other Exhibits F6-162A – F6-162E, F6-112A – F6-112E references and/or one or more references identified and charted in Exhibits F6 Secondary - 162, F6 Secondary – 112 and in view of the knowledge, experience, and understanding of persons of ordinary skill in the art.

Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with another to render obvious (and therefore invalid) each of TQ Delta’s Asserted Claims. Nokia Defendants may rely on a subset of (or all of) the above-identified references, including all references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112, for purposes of obviousness depending on the Court’s claim construction, positions taken by TQ Delta during this litigation, and further investigation and discovery.

b) Exemplary Combinations of the Prior Art.

The table below provides an identification of exemplary combinations of prior art references that, based on Nokia Defendants’ present understanding of TQ Delta’s Preliminary Infringement Contentions and apparent reading of the Asserted Claims, render obvious one or more of the Asserted Claims of the Family 6 Patents. The combinations of references identified below are non-exhaustive, and additional examples are apparent from other combinations of references addressed in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112. Nokia Defendants expressly note that, although certain references

charted in Exhibits F6-162A – F6-162E, F6-112A – F6-112E are listed variously in the left or right column below, Nokia Defendants do not thereby imply any restriction as to which Exhibits F6-162A – F6-162E, F6-112A – F6-112E reference is primary and which Exhibits F6-162A – F6-162E, F6-112A – F6-112E reference is secondary in such a combination. Nokia Defendants reserve the right to rely on either identified reference in the identified combinations as a primary and/or secondary reference.

Reference	Combination References
ITU-T Recommendation G.992.1 ("G.992.1")	G.992.3, Cioffi, SC-060, Abbas, and/or one or more references as charted in Exhibits F6 Secondary - 162, F6 Secondary - 112
ITU-T Recommendation G.992.3 ("G.992.3")	G.992.1, Cioffi, SC-060, Abbas, and/or one or more references as charted in Exhibits F6 Secondary - 162, F6 Secondary - 112
U.S. Patent No. 7,428,669 to Cioffi ("Cioffi")	G.992.1, G.992.3, SC-060, Abbas and/or one or more references as charted in Exhibits F6 Secondary - 162, F6 Secondary - 112
Temporary Document SC-060 titled "G.gen, G.dmt, G.lite.bis: Protocol for On-Line Reconfiguration of ADSL" ("SC-060")	G.992.1, G.992.3, Cioffi, Abbas, and/or one or more references as charted in Exhibits F6 Secondary - 162, F6 Secondary - 112
U.S. Patent Pub. No. US2002/0080867 to Abbas et al. ("Abbas")	G.992.1, G.992.3, Cioffi, SC-060, and/or one or more references as charted in Exhibits F6 Secondary - 162, F6 Secondary - 112

It would have been obvious to combine these references for reasons that are readily apparent to one of ordinary skill in the art, and for reasons explained herein.

c) Prior Art Solutions

In addition to the exemplary combinations provided above, to the extent TQ Delta alleges the references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 do not disclose any particular limitation of the Asserted Claims of the Family 6

Patents, either expressly or inherently, it would have been obvious to a person of ordinary skill in the art as of the alleged invention date of the Family 6 Patents to modify the references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 and/or combine the teachings of the references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with the other prior art references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 in a manner that would have rendered the Asserted Claims invalid as obvious. Nokia Defendants provide examples of such combinations below. The exemplary combinations below are non-exhaustive, and Nokia Defendants reserve the right to rely on additional combinations as may be apparent from the prior art references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112. These obviousness combinations should not be construed to suggest that any reference included in any combination is not anticipatory in its own right.

(1) Exemplary G.992.1 Solutions

A person of ordinary skill in the art would be motivated to combine G.992.1 with G.992.3 for many reasons. For example, G.992.1 describes requirements for DSL transceivers and employs “Dynamic (on-line) Rate Adaptation” which “allows reconfiguration of the modem during Showtime” without “a lengthy restart to reconfigure the modem.” *See, e.g.*, G.992.1 at § II.1. A person having ordinary skill in the art would have been motivated to modify the teachings of G.992.1 with the analogous teachings of G.992.3 because it is similarly directed to requirements for DSL transceivers in connection with “on-line reconfiguration.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, which are similar in both references. In addition, a person of ordinary skill in the art would be motivated to combine G.992.1 with G.992.3 because G.992.1 and G.992.3 are publications by the same ITU-T telecommunication

standardization sector, and both references are recommendations issued by ITU-T. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.992.3's teachings with those of G.992.1. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.992.3 with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.992.1 with Cioffi for many reasons. For example, G.992.1 describes requirements for DSL transceivers and employs “Dynamic (on-line) Rate Adaptation” which “allows reconfiguration of the modem during Showtime” without “a lengthy restart to reconfigure the modem.” *See, e.g.*, G.992.1 at § II.1. A person having ordinary skill in the art would have been motivated to modify the teachings of G.992.1 to implement the details taught by Cioffi because it is similarly directed to DSL transceivers involved in adjusting, adapting, and altering parameters, including adjustments of the interleaver depth, using a codeword composition ratio (CCR). A person of ordinary skill in the art would be motivated by the advantages of such functionality, which is similar to the “Dynamic (on-line) Rate Adaptation” of G.992.1. In addition, a person of ordinary skill in the art would be motivated to combine G.992.1 with Cioffi because (a) G.992.1 and Cioffi disclose similar DSL transceivers performing similar functionality, and (b) both references are analogous art and in the same field of endeavor as each other. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Cioffi's teachings with those of G.992.1. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cioffi with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.992.1 with SC-060 for many reasons. For example, G.992.1 describes requirements for DSL transceivers and employs “Dynamic (on-line) Rate Adaptation” which “allows reconfiguration of the modem during Showtime” without “a lengthy restart to reconfigure the modem.” *See, e.g.*, G.992.1 at § II.1. A person having ordinary skill in the art would have been motivated to modify the teachings of G.992.1 to implement the details taught by SC-060 because it is similarly directed to DSL transceivers involved in “on-line reconfiguration,” including both Dynamic Rate Repartitioning (DRR) and Seamless Rate Adaptation (SRA). A person of ordinary skill in the art would be motivated by the advantages of such functionality, which is similar to the “Dynamic (on-line) Rate Adaptation” of G.992.1. In addition, a person of ordinary skill in the art would be motivated to combine G.992.1 with SC-060 because (a) G.992.1 and SC-060 disclose similar DSL transceivers performing similar functionality, and (b) both references are analogous art and in the same field of endeavor as each other. Moreover, a POSITA would have had a reasonable expectation of success in incorporating SC-060’s teachings with those of G.992.1. For similar reasons, a person of ordinary skill in the art would be motivated to combine SC-060 with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.992.1 with Abbas for many reasons. For example, G.992.1 describes requirements for DSL transceivers and employs “Dynamic (on-line) Rate Adaptation” which “allows reconfiguration of the modem during Showtime” without “a lengthy restart to reconfigure the modem.” *See, e.g.*, G.992.1 at § II.1. A person having ordinary skill in the art would have been motivated to modify the teachings of G.992.1 to implement the details taught by Abbas because it is similarly directed to DSL

transceivers involved in “On Line Reconfiguration (OLR).” A person of ordinary skill in the art would be motivated by the advantages of such functionality, which is similar to the “Dynamic (on-line) Rate Adaptation” of G.992.1. In addition, a person of ordinary skill in the art would be motivated to combine G.992.1 with Abbas because (a) G.992.1 and Abbas disclose similar DSL transceivers performing similar functionality, and (b) both references are analogous art and in the same field of endeavor as each other. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Abbas’s teachings with those of G.992.1. For similar reasons, a person of ordinary skill in the art would be motivated to combine Abbas with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with similar teachings.

(2) Exemplary G.992.3 Solutions

A person of ordinary skill in the art would be motivated to combine G.992.3 with G.992.1 for many reasons. For example, G.992.3 describes a “enhanced on-line reconfiguration capabilities including bitswaps and seamless rate adaptation.” *See, e.g.*, G.992.3 at Summary, p. ii. A person having ordinary skill in the art would have been motivated to modify the teachings of G.992.3 with the analogous teachings of G.992.1 because it is similarly directed to requirements for DSL transceivers in connection with “on-line reconfiguration.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, which are similar in both references. In addition, a person of ordinary skill in the art would be motivated to combine G.992.3 with G.992.1 because G.992.3 and G.992.1 are publications by the same ITU-T telecommunication standardization sector, and both references are recommendations issued by ITU-T. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.992.1’s teachings with those of G.992.3. For similar reasons, a person of ordinary skill in the art would be motivated

to combine G.992.1 with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.992.3 with Cioffi for many reasons. For example, G.992.3 describes a “enhanced on-line reconfiguration capabilities including bitswaps and seamless rate adaptation.” *See, e.g.*, G.992.1 at Summary, p. ii. A person having ordinary skill in the art would have been motivated to modify the teachings of G.992.3 to implement the details taught by Cioffi because it is similarly directed to DSL transceivers involved in adjusting, adapting, and altering parameters, including adjustments of the interleaver depth, using a codeword composition ratio (CCR). A person of ordinary skill in the art would be motivated by the advantages of such functionality, which is similar to the “Dynamic (on-line) Rate Adaptation” of G.992.3. In addition, a person of ordinary skill in the art would be motivated to combine G.992.3 with Cioffi because (a) G.992.3 and Cioffi disclose similar DSL transceivers performing similar functionality, and (b) both references are analogous art and in the same field of endeavor as each other. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Cioffi’s teachings with those of G.992.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cioffi with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.992.3 with SC-060 for many reasons. For example, G.992.3 describes a “enhanced on-line reconfiguration capabilities including bitswaps and seamless rate adaptation.” *See, e.g.*, G.992.1 at Summary, p. ii. A person having ordinary skill in the art would have been motivated to modify the teachings of G.992.3 to implement the details taught by SC-060 because it is similarly directed to DSL transceivers involved in “on-line reconfiguration,” including both Dynamic Rate Repartitioning (DRR) and

Seamless Rate Adaptation (SRA). A person of ordinary skill in the art would be motivated by the advantages of such functionality, which is similar to the “Dynamic (on-line) Rate Adaptation” of G.992.3. In addition, a person of ordinary skill in the art would be motivated to combine G.992.3 with SC-060 because (a) G.992.3 and SC-060 disclose similar DSL transceivers performing similar functionality, and (b) both references are analogous art and in the same field of endeavor as each other. Moreover, a POSITA would have had a reasonable expectation of success in incorporating SC-060’s teachings with those of G.992.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine SC-060 with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.992.3 with Abbas for many reasons. For example, G.992.3 describes a “enhanced on-line reconfiguration capabilities including bitswaps and seamless rate adaptation.” *See, e.g.*, G.992.1 at Summary, p. ii. A person having ordinary skill in the art would have been motivated to modify the teachings of G.992.3 to implement the details taught by Abbas because it is similarly directed to DSL transceivers involved in “On Line Reconfiguration (OLR).” A person of ordinary skill in the art would be motivated by the advantages of such functionality, which is similar to the “Dynamic (on-line) Rate Adaptation” of G.992.3. In addition, a person of ordinary skill in the art would be motivated to combine G.992.3 with Abbas because (a) G.992.3 and Abbas disclose similar DSL transceivers performing similar functionality, and (b) both references are analogous art and in the same field of endeavor as each other. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Abbas’s teachings with those of G.992.3. For similar reasons, a person of ordinary skill in the art

would be motivated to combine Abbas with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with similar teachings.

(3) Exemplary Cioffi Solutions

A person of ordinary skill in the art would be motivated to combine Cioffi with G.992.1 for many reasons. For example, Cioffi describes a DSL transceivers involved in adjusting, adapting, and altering parameters, including adjustments of the interleaver depth, using a codeword composition ratio (CCR). *See, e.g.*, Cioffi at 4:22-51. A person having ordinary skill in the art would have been motivated to modify the teachings of Cioffi with the analogous teachings of G.992.1 because it is similarly directed to requirements for DSL transceivers in connection with “on-line reconfiguration.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, which are similar in both references. In addition, a person of ordinary skill in the art would be motivated to combine Cioffi with G.992.1 because Cioffi and G.992.1 are publications by the same ITU-T telecommunication standardization sector, and both references are recommendations issued by ITU-T. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.992.1’s teachings with those of Cioffi. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.992.1 with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Cioffi with G.992.3 for many reasons. For example, Cioffi describes a DSL transceivers involved in adjusting, adapting, and altering parameters, including adjustments of the interleaver depth, using a codeword composition ratio (CCR). *See, e.g.*, Cioffi at 4:22-51. A. person having ordinary skill in the art would have been motivated to modify the teachings of Cioffi with the analogous teachings of

G.992.3 because it is similarly directed to requirements for DSL transceivers in connection with “on-line reconfiguration.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, which are similar in both references. In addition, a person of ordinary skill in the art would be motivated to combine Cioffi with G.992.3 because Cioffi and G.992.3 are analogous art and in the same field of endeavor as each other. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.992.3’s teachings with those of Cioffi. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.992.3 with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Cioffi with SC-060 for many reasons. For example, Cioffi describes a DSL transceivers involved in adjusting, adapting, and altering parameters, including adjustments of the interleaver depth, using a codeword composition ratio (CCR). *See, e.g.*, Cioffi at 4:22-51. A person having ordinary skill in the art would have been motivated to modify the teachings of Cioffi to implement the details taught by SC-060 because it is similarly directed to DSL transceivers involved in “on-line reconfiguration,” including both Dynamic Rate Repartitioning (DRR) and Seamless Rate Adaptation (SRA). A person of ordinary skill in the art would be motivated by the advantages of such functionality, which is similar to the “Dynamic (on-line) Rate Adaptation” of Cioffi. In addition, a person of ordinary skill in the art would be motivated to combine Cioffi with SC-060 because (a) Cioffi and SC-060 disclose similar DSL transceivers performing similar functionality, and (b) both references are analogous art and in the same field of endeavor as each other. Moreover, a POSITA would have had a reasonable expectation of success in incorporating SC-060’s teachings with those of Cioffi. For similar reasons, a person of ordinary skill in the art would be motivated to combine

SC-060 with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Cioffi with Abbas for many reasons. For example, Cioffi describes a DSL transceivers involved in adjusting, adapting, and altering parameters, including adjustments of the interleaver depth, using a codeword composition ratio (CCR). *See, e.g.*, Cioffi at 4:22-51. A person having ordinary skill in the art would have been motivated to modify the teachings of Cioffi to implement the details taught by Abbas because it is similarly directed to DSL transceivers involved in “On Line Reconfiguration (OLR).” A person of ordinary skill in the art would be motivated by the advantages of such functionality, which is similar to the “Dynamic (on-line) Rate Adaptation” of Cioffi. In addition, a person of ordinary skill in the art would be motivated to combine Cioffi with Abbas because (a) Cioffi and Abbas disclose similar DSL transceivers performing similar functionality, and (b) both references are analogous art and in the same field of endeavor as each other. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Abbas’s teachings with those of Cioffi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Abbas with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with similar teachings.

(4) Exemplary SC-060 Solutions

A person of ordinary skill in the art would be motivated to combine SC-060 with G.992.1 for many reasons. For example, SC-060 describes DSL transceivers involved in “on-line reconfiguration,” including both Dynamic Rate Repartitioning (DRR) and Seamless Rate Adaptation (SRA). *See, e.g.*, SC-060 at 1-2. A person having ordinary skill in the art would have been motivated to modify the teachings of SC-060 with the analogous teachings of G.992.1

because it is similarly directed to requirements for DSL transceivers in connection with “on-line reconfiguration.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, which are similar in both references. In addition, a person of ordinary skill in the art would be motivated to combine SC-060 with G.992.1 because SC-060 and G.992.1 are contributions and publications of the ITU-T telecommunication standardization body, and both references are analogous art and in the same field of endeavor as each other. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.992.1’s teachings with those of SC-060. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.992.1 with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with similar teachings.

A person of ordinary skill in the art would be motivated to combine SC-060 with G.992.3 for many reasons. For example, SC-060 describes DSL transceivers involved in “on-line reconfiguration,” including both Dynamic Rate Repartitioning (DRR) and Seamless Rate Adaptation (SRA). *See, e.g.*, SC-060 at 1-2. A person having ordinary skill in the art would have been motivated to modify the teachings of SC-060 with the analogous teachings of G.992.3 because it is similarly directed to requirements for DSL transceivers in connection with “on-line reconfiguration.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, which are similar in both references. In addition, a person of ordinary skill in the art would be motivated to combine SC-060 with G.992.3 because SC-060 and G.992.3 are contributions and publications of the ITU-T telecommunication standardization body, and both references are analogous art and in the same field of endeavor as each other. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.992.3’s teachings with those of SC-060. For similar reasons, a person of ordinary skill in the art would be motivated to

combine G.992.3 with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with similar teachings.

A person of ordinary skill in the art would be motivated to combine SC-060 with Cioffi for many reasons. For example, SC-060 describes DSL transceivers involved in “on-line reconfiguration,” including both Dynamic Rate Repartitioning (DRR) and Seamless Rate Adaptation (SRA). *See, e.g.*, SC-060 at 1-2. A person having ordinary skill in the art would have been motivated to modify the teachings of SC-060 to implement the details taught by Cioffi because it is similarly directed to DSL transceivers involved in adjusting, adapting, and altering parameters, including adjustments of the interleaver depth, using a codeword composition ratio (CCR). A person of ordinary skill in the art would be motivated by the advantages of such functionality, which is similar to the “Dynamic (on-line) Rate Adaptation” of SC-060. In addition, a person of ordinary skill in the art would be motivated to combine SC-060 with Cioffi because (a) SC-060 and Cioffi disclose similar DSL transceivers performing similar functionality, and (b) both references are analogous art and in the same field of endeavor as each other. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Cioffi’s teachings with those of SC-060. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cioffi with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with similar teachings.

A person of ordinary skill in the art would be motivated to combine SC-060 with Abbas for many reasons. For example, SC-060 describes DSL transceivers involved in “on-line reconfiguration,” including both Dynamic Rate Repartitioning (DRR) and Seamless Rate Adaptation (SRA). *See, e.g.*, SC-060 at 1-2. A person having ordinary skill in the art would have been motivated to modify the teachings of SC-060 to implement the details taught by Abbas

because it is similarly directed to DSL transceivers involved in “On Line Reconfiguration (OLR).” A person of ordinary skill in the art would be motivated by the advantages of such functionality, which is similar to the “Dynamic (on-line) Rate Adaptation” of SC-060. In addition, a person of ordinary skill in the art would be motivated to combine SC-060 with Abbas because (a) SC-060 and Abbas disclose similar DSL transceivers performing similar functionality, and (b) both references are analogous art and in the same field of endeavor as each other. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Abbas’s teachings with those of SC-060. For similar reasons, a person of ordinary skill in the art would be motivated to combine Abbas with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with similar teachings.

(5) Exemplary Abbas Solutions

A person of ordinary skill in the art would be motivated to combine Abbas with G.992.1 for many reasons. For example, Abbas describes DSL transceivers involved in “On Line Reconfiguration (OLR).” *See, e.g.,* Abbas at [0054]. A person having ordinary skill in the art would have been motivated to modify the teachings of Abbas with the analogous teachings of G.992.1 because it is similarly directed to requirements for DSL transceivers in connection with “on-line reconfiguration.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, which are similar in both references. In addition, a person of ordinary skill in the art would be motivated to combine Abbas with G.992.1 because Abbas and G.992.1 are both references are analogous art and in the same field of endeavor as each other. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.992.1’s teachings with those of Abbas. For similar reasons, a person of ordinary skill in the art

would be motivated to combine G.992.1 with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Abbas with G.992.3 for many reasons. For example, Abbas describes DSL transceivers involved in “On Line Reconfiguration (OLR).”. *See, e.g.*, Abbas at [0054]. A person having ordinary skill in the art would have been motivated to modify the teachings of Abbas with the analogous teachings of G.992.3 because it is similarly directed to requirements for DSL transceivers in connection with “on-line reconfiguration.” A person of ordinary skill in the art would be motivated by the advantages of such functionality, which are similar in both references. In addition, a person of ordinary skill in the art would be motivated to combine Abbas with G.992.3 because Abbas and G.992.3 are both references are analogous art and in the same field of endeavor as each other. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.992.3’s teachings with those of Abbas. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.992.3 with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Abbas with Cioffi for many reasons. For example, Abbas describes DSL transceivers involved in “On Line Reconfiguration (OLR).”. *See, e.g.*, Abbas at [0054]. A person having ordinary skill in the art would have been motivated to modify the teachings of Abbas to implement the details taught by Cioffi because it is similarly directed to DSL transceivers involved in adjusting, adapting, and altering parameters, including adjustments of the interleaver depth, using a codeword composition ratio (CCR). A person of ordinary skill in the art would be motivated by the advantages of such functionality, which is similar to the “Dynamic (on-line) Rate Adaptation” of Abbas. In addition,

a person of ordinary skill in the art would be motivated to combine Abbas with Cioffi because (a) Abbas and Cioffi disclose similar DSL transceivers performing similar functionality, and (b) both references are analogous art and in the same field of endeavor as each other. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Cioffi's teachings with those of Abbas. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cioffi with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Abbas with SC-060 for many reasons. For example, Abbas describes DSL transceivers involved in "On Line Reconfiguration (OLR)". *See, e.g.*, Abbas at [0054]. A person having ordinary skill in the art would have been motivated to modify the teachings of Abbas to implement the details taught by SC-060 because it is similarly directed to DSL transceivers involved in "on-line reconfiguration," including both Dynamic Rate Repartitioning (DRR) and Seamless Rate Adaptation (SRA). A person of ordinary skill in the art would be motivated by the advantages of such functionality, which is similar to the "Dynamic (on-line) Rate Adaptation" of Abbas. In addition, a person of ordinary skill in the art would be motivated to combine Abbas with SC-060 because (a) Abbas and SC-060 disclose similar DSL transceivers performing similar functionality, and (b) both references are analogous art and in the same field of endeavor as each other. Moreover, a POSITA would have had a reasonable expectation of success in incorporating SC-060's teachings with those of Abbas. For similar reasons, a person of ordinary skill in the art would be motivated to combine SC-060 with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with similar teachings.

(6) Example Obviousness References Solutions

A person of ordinary skill in the art would be motivated to combine G.992.1, G.992.3, Cioffi, SC-060, and Abbas (the “Primary References”) with the Secondary References for many reasons. As described above, each of the primary references teach requirements for DSL transceivers that employ functionality for dynamically changing the interleave depth, rate adaptation, and the like. *See* Sections VI.B.3.c)(1)-(5). A person having ordinary skill in the art would have been motivated to modify the teachings of the Primary References to implement the details of the Secondary References because they are also directed to transceivers in communication systems using interleaving in combination with forward error correction to correct or address errors caused by, for example, impulse noise, or similar or related technologies. For example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of “adaptive forward error correction in a data communication system (100) [that] provides for dynamically changing forward error correction parameters.” Klayman at Abstract. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of channel assessment to determine or generate a coding rate. Kong at claim 1. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as changing the operating parameters for the involved transceivers. Mahany at ¶ [0134]. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of online reconfiguration of transmission parameters in a DSL environment. Wunsch at ¶ [0002]. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of error correction techniques. JP 758 at ¶¶ [0018], [0020]. As another example, a person of ordinary skill in the art would be motivated by the advantages of such

functionality, such as the use of a counter associated with errors and error correction. Gross at ¶ [0106]. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as teachings regarding avoiding bit errors or service interruptions. Tzannes at 6:36-56. In addition, a person of ordinary skill in the art would be motivated to combine any Primary Reference with and Secondary reference because (a) each reference discloses similar products and the references are analogous art and in the same field of endeavor as each other. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the Secondary References' teachings with those of the Primary References. For similar reasons, a person of ordinary skill in the art would be motivated to combine the Primary References with other references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 with similar teachings.

d) The Claims Recite Well-Known Concepts That Would Have Been Obvious to Implement.

The Asserted Claims represent nothing more than an arrangement of well-known concepts and features, and add nothing to the state of the art at the time of the alleged invention. For each of the concepts represented by the Asserted Claims, it would have been obvious to add to the teachings of any number of known products and references, including to the teachings of any of the primary references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 to the extent that such reference is alleged to be missing such concept or feature. The following are examples of concepts that would have been obvious, which is not intended to be an exhaustive list of the claimed features that would have been obvious. Nokia Defendants reserve the right to supplement these examples as necessary.

- (1) It would have been obvious to modify any primary reference to “change to transmitting using a second interleaver parameter value ... following transmission of [a] flag signal” (’162

Patent) or to “switch ... to receiving using a second FIP setting ... based on a counter reaching a value” (’112 Patent).

To the extent TQ Delta contends that any reference charted in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 does not disclose “chang[ing] to transmitting using a second interleaver parameter value ... following transmission of [a] flag signal” (162 Patent) or “switch[ing] ... to receiving using a second FIP setting ... based on a counter reaching a value” (112 Patent), it would have been obvious to combine such well-known features with any of the references charted in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112. A person having ordinary skill in the art would have been motivated to employ or implement these features. *See, e.g.*, Klayman at 7:37 – 8:63, 9:56 – 10:26, Figs. 4, 5; Kong at 11:35-41; Mahany at ¶¶ [0134], [0137] – [0139], claim 41; Wunsch at ¶¶ [0015], [0019] – [0020], [0044] – [0057], Fig. 4; JP 758 at ¶¶ [0018], [0020], [0059] (translation); Gross at ¶ [0106]. A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement these features. *See id.* Employing the concepts of “chang[ing] to transmitting using a second interleaver parameter value ... following transmission of [a] flag signal” (162 Patent) or “switch[ing] ... to receiving using a second FIP setting ... based on a counter reaching a value” (112 Patent), would have accomplished the same goal, but with using well-known concepts for determining when to make the “change” (162 Patent) or “switch” (112 Patent). Little or no complexity would have been involved in including these features, as adding the features would have fit together with the other features and functionalities like pieces of a puzzle.

(2) It would have been obvious to modify any primary reference such that the “change” or “switch” is associated with “an impulse noise protection value, a data rate and a latency value” (’162 and ’112 Patents) or such that the “switch” “does not cause bit errors or service interruption,” “is associated with a service

provider configuration,” or does not change “data rate and/or latency” (’112 Patent).

To the extent TQ Delta contends that any reference charted in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 does not disclose that the “change” or “switch” is associated with “an impulse noise protection value, a data rate and a latency value” (’162 and ’112 Patents) or that the “switch” “does not cause bit errors or service interruption,” “is associated with a service provider configuration,” or does not change “data rate and/or latency” (112 Patent), it would have been obvious to combine such well-known features with any of the references charted in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112. A person having ordinary skill in the art would have been motivated to employ or implement these features. *See, e.g.*, Klayman at Abstract, 1:39-64, 5:37-54, 7:37-55, 9:11-39; Kong at 1:6-11, 1:56 – 2:35, 7:3-51, 13:56 – 14:55, Table 3; Mahany at ¶ [0130]; Wunsch at ¶¶ [0009], [0038], [0071], Fig. 1B; JP 758 at ¶¶ [0016], [0019], [0034], [0041] (translation); Gross at ¶ [0030]; Tzannes at 6:36-56. A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement these features. *See id.* Employing these concepts (i.e., where the “change” or “switch” is associated with “an impulse noise protection value, a data rate and a latency value” (162 and 112 Patents) or where the “switch” “does not cause bit errors or service interruption,” “is associated with a service provider configuration,” or does not change “data rate and/or latency” (112 Patent)) would have accomplished the same goal, but with using well-known concepts for determining how to make or implement the “change” (162 Patent) or “switch” (112 Patent). Little or no complexity would have been involved in including these features, as adding the features would have fit together with the other features and functionalities like pieces of a puzzle.

e) Additional Reasons to Combine.

In addition to the information contained elsewhere in these invalidity contentions, including in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112, Nokia Defendants have identified additional motivations and reasons to combine the various references. Nokia Defendants note that in *KSR Int’l Co. v. Teleflex Inc.*, the Supreme Court held that “[i]n determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. What matters is the objective reach of the claim. If the claim extends to what is obvious, it is invalid under § 103.” 127 S. Ct. 1727, 1742 (2007).

KSR further illustrated several ways in which the subject matter of a patent claim may be shown to have been obvious. For instance, “[o]ne of the ways in which a patent’s subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent’s claims.” *KSR*, 127 S. Ct. at 1742. The Supreme Court held that it was error to “look only to the problem the patentee was trying to solve.” *Id.* As the Court explained, “[t]he question is not whether the combination was obvious to the patentee but whether the combination was obvious to a person with ordinary skill in the art. Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *Id.* Further, “[c]ommon sense teaches ... that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle.” *Id.* Further, a showing that a combination of elements was “obvious to try” may demonstrate that it was obvious under § 103.

Id. For instance, the Supreme Court held that “predictable solutions” using a combination of “known options” may render the subject matter of a patent claim obvious. *Id.*

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product was not of innovation but of ordinary skill and common sense. *Id.* The ways in which the subject matter of a patent claim may be shown to be obvious, identified by *KSR*, are merely illustrative. A core thrust of *KSR* was that “[r]igid preventative rules that deny factfinders recourse to common sense are neither necessary under our case law nor consistent with it.” *KSR*, 127 S. Ct. at 1742-43 (quoting *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1367 (Fed. Cir. 2006) (“Our suggestion test is in actuality quite flexible and not only permits, but requires, consideration of common knowledge and common sense”), and *Alza Corp. v. Mylan Labs., Inc.*, 464 F.3d 1286, 1291 (Fed. Cir. 2006) (“There is flexibility in our obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires an actual teaching to combine ...”).

Although Nokia Defendants note that there is no longer a rigid requirement regarding motivation to combine under *KSR*, Nokia Defendants provide the following statements regarding motivation to combine. Multiple teachings, suggestions, and/or reasons to modify any of the references and/or to combine any two or more of the references in Exhibits F6-162A – F6-162E, F6-112A – F6-112E and F6 Secondary - 162, F6 Secondary - 112 come from many sources, including the prior art (specific and as a whole), common knowledge, common sense, predictability, expectations, industry trends, design incentives or need, market demands or pressure, market forces, obvious to try, the nature of the problem faced, and/or knowledge

possessed by one of ordinary skill. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one.

The combination of prior art references identified in these contentions would have been obvious because the combination represents the known potential options with a reasonable expectation of success. Additionally, one of ordinary skill in the art would have been motivated to create combinations identified in these contentions using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or teaching, suggestion, or motivation in the prior art generally. Also, market forces in the industry, and the desire to improve features and performance, would motivate the addition of features to systems as they became available, became less expensive, became more commonly used, provided better performance, reduced costs, size or weight, or predictably achieved other desirable results.

C. Other Grounds for Invalidity

Nokia Defendants identify the following additional grounds for invalidity of the Asserted Claims of the Family 6 Patents. Nokia Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

1. Invalidity of the Family 6 Patents Based on 35 U.S.C. § 112, ¶ 1 (Enablement and Written Description)

Based on Nokia Defendants' present understanding of TQ Delta's asserted scope of the claims of the Family 6 Patents, to the extent such positions can be understood from TQ Delta's Preliminary Infringement Contentions, the Asserted Claims of the Family 6 Patents are invalid for

reciting at least the following claim terms, phrases, or limitations that lack enablement or sufficient written description:

- “transmission on a pre-defined forward error correction codeword boundary following transmission of the flag signal” (’162 Patent, claim 8)
- “the switching to receiving using the second FEC codeword size and the second number of FEC coding parity bytes is based on a counter reaching a value” (’112 Patent, claim 8)
- “associated with a service provider configuration” (’112 Patent, claim 12)

These claim terms, phrases, and limitations, as apparently construed by TQ Delta, fail to satisfy the enablement and/or written description requirements of 35 U.S.C. § 112. This is at least because the specifications of the Family 6 Patents demonstrate that the patentee neither conceived of nor demonstrated possession of all that TQ Delta now contends the claims cover. In addition, based on Defendant’s present understanding of TQ Delta’s Preliminary Infringement Contentions, each of the Asserted Claims of the Family 6 Patents in which these claim terms, phrases, and limitations appear is invalid because the specification fails to provide sufficient disclosure to enable a person of ordinary skill in the art to which the alleged invention pertains, or with which it is most nearly connected, to implement the alleged invention without undue experimentation.

2. Invalidity of the Family 6 Patents Based on 35 U.S.C. § 112, ¶ 2 (Indefiniteness)

Based on Nokia Defendants’ present understanding of TQ Delta’s asserted scope of the claims of the Family 6 Patents, to the extent such positions can be understood from TQ Delta’s Preliminary Infringement Contentions, Nokia Defendants assert that the Asserted Claims of the Family 6 Patents are invalid for reciting at least the following indefinite claim terms, phrases, or limitations:

- “flag signal” (’162 Patent, claim 8)
- “pre-defined forward error correction codeword boundary” (’162 Patent, claim 8)

- “forward error correction (FEC) codeword size” (’112 Patent, claim 8)
- “second FEC codeword size” (’112 Patent, claim 8)
- “a service provider configuration” (’112 Patent, claim 12)

These claim terms, phrases, and limitations, as apparently construed by TQ Delta, violate the definiteness requirements of 35 U.S.C. § 112.

Based on Nokia Defendants’ present understanding of TQ Delta’s Preliminary Infringement Contentions, these claim terms, phrases, and limitations are indefinite because they are inconsistent with and broader than the alleged invention disclosed in the specification and during prosecution. And given TQ Delta’s apparent constructions of the claim terms, phrases, and limitations, persons of ordinary skill in the art at the time of the invention would not have understood what is claimed with reasonable certainty, even when the claims are read in light of the specification and prosecution history.

3. Additional Grounds for Invalidity of the Family 6 Patents

In addition to the preceding invalidity contentions, Nokia Defendants reserve the right to assert that the Asserted Claims are invalid under 35 U.S.C. § 102(f) and/or § 102(g) in the event that Nokia Defendants obtain evidence that the named inventor of the Family 6 Patents did not invent (either alone or in conjunction with other parties) the subject matter claimed in the Family 6 Patents. Should Nokia Defendants obtain such evidence, Nokia Defendants will provide the name of the person(s) from whom and the circumstances under which the invention or any part of it was derived, and/or the circumstances surrounding the making of the invention before the patent application.

Nokia Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

VII. THE ASSERTED FAMILY 9 PATENTS ARE INVALID.

A. Identification of Prior Art

Nokia Defendants contend that the prior art references described and charted in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809 anticipate and/or render obvious, alone or in combination, one or more of the Asserted Claims of the Family 9.

B. The Asserted Claims Are Anticipated and/or Rendered Obvious.

TQ Delta asserts claims 10, 11, 17, 18, 19, and 25 of 8,468,411, claims 16, 17, 18, 30, 31, 32, 37, 38, 39, 44, 53, 54, 55, and 60 of 8,595,577, claims 1, 2, 3, 4, 9, 10, 11, and 12 of 9,094,348, claims 11, 17, and 19 of 9,485,055, claims 1, 2, 3, 4, and 8 of 10,044,473, and claims 1, 2, 3, 4, 6, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 20, 22, 23, 24, 25, and 27 of 10,833,809 (collectively, the “Family 9 Patents”) against Nokia Defendants in this lawsuit. These claims are invalid because the Family 9 Patents fail to meet one or more of the requirements for patentability. The individual bases for invalidity are provided below and in F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809. Each of the prior art references, the underlying work, and/or the underlying apparatus or method qualifies as prior art under one or more sections of 35 U.S.C. §§ 102 and/or 103.

In an effort to focus the issues, Nokia Defendants have cited representative portions of identified references, even where a reference may contain additional disclosures or support for a particular claim element. Each and every disclosure of the same limitation in the same reference is not necessarily identified. In addition, persons of ordinary skill in the art generally read a prior

art reference as a whole and in the context of other publications and literature and in the context of their knowledge as persons of ordinary skill in the art. Thus, to understand and interpret any specific statement or disclosure within a prior art reference, such persons would rely on other information within the reference, along with other publications and their general scientific knowledge and experience in the field. Thus, each prior art reference identified herein should be understood in the context of the reference itself, in conjunction with anything incorporated by reference or described as relevant technology by the reference, any documents that are referred to for further understanding by the reference, any system embodying the reference, and any testimony by those with knowledge of the reference, such as the named authors and inventors. Nokia Defendants may rely on uncited portions of the prior art references and on other publications and expert testimony to provide context, and as aids to understanding and interpreting the portions that are cited. Nokia Defendants may also rely on uncited portions of the prior art references, other disclosed publications, and the testimony of experts to establish that a person of ordinary skill in the art would have been motivated to modify or combine certain of the cited references so as to render the claims obvious.

1. The Family 9 Patent Priority Date.

TQ Delta's Preliminary Infringement Contentions allege that the Asserted Claims of the '411, '557, '348 patents are entitled to a priority date of October 5, 2006, or, in the alternative, April 12, 2007, or in the alternative April 15, 2010. TQ Delta's Preliminary Infringement Contentions allege that the Asserted Claims of the '4473 patent are entitled to a priority date of April 12, 2006 or, in the alternative, October 5, 2006, or, in the alternative, April 12, 2007, or in the alternative April 15, 2010. TQ Delta's Preliminary Infringement Contentions allege that the Asserted Claims of the '809 patent are entitled to a priority date of April 12, 2006 or, in the

alternative, October 5, 2006, or, in the alternative, April 12, 2007, or in the alternative April 15, 2010 or, in the alternative, April 8, 2013. TQ Delta's Preliminary Infringement Contentions allege that the Asserted Claims of the '055 patent are entitled to a priority date of April 12, 2006 or, in the alternative, October 5, 2006, or, in the alternative, April 12, 2007, or in the alternative May 10, 2010 or, in the alternative, February 13, 2013. To the extent TQ Delta alleges that any prior art relied on in these invalidity contentions does not qualify as prior art to an Asserted Patent, Nokia Defendants reserve the right to rebut those allegations (*e.g.*, by demonstrating an earlier relevant date for the challenged prior art and/or a later priority date for the Asserted Patent and/or Asserted Claim).

2. The Family 9 Patents Are Anticipated and/or Rendered Obvious by the Prior Art.

Some or all of the Asserted Claims of the Family 9 Patents are invalid as anticipated and/or rendered obvious under 35 U.S.C. §§ 102 and/or 103 in view of each of the primary prior art references identified in the claim charts included in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J, which identify specific examples of where each limitation of the Asserted Claims is found in the prior art references. As explained above, the cited portions of prior art references identified in the attached claim charts are exemplary in nature and representative of the content and teaching of the prior art references, and should be understood in the context of the reference as a whole and as they would be understood by a person of ordinary skill in the art.

Nokia Defendants identify the following references as anticipating and/or rendering obvious one or more of the Asserted Claims of the Family 9 Patents under 35 U.S.C. §§ 102 and/or 103. The table of anticipating and/or rendering obvious references below is exemplary, and it does not constitute an admission that any reference not listed below does not also anticipate and/or

render obvious the claims of the Family 9 Patents. Further, Nokia Defendants contend that any prior art reference in the attached charts that is charted for each limitation of any given claim, anticipates that claim, regardless of whether that prior art reference is listed in the following table.

Exhibits	Primary Prior Art	Date⁵
F9-577A F9-348A F9-809A F9-4473A	“Interleaved FEC/ARQ coding for QoS multicast over the Internet” by Chen et al., (“Chen”)	July 2004
F9-577B F9-348B F9-809B F9-4473B	U.S. Patent No. 6,865,233 to Eriksson (“Eriksson”)	February 19, 1999
F9-577C F9-348C F9-809C F9-4473C	ITU-T Recommendation G.992.3 (01/2005) (“G.992.3”)	January 2005
F9-577D F9-348D F9-809D F9-4473D	U.S. Patent No. 7,502,818 to Kohno et al. (“Kohno”)	July 3, 2003
F9-577E F9-348E F9-809E F9-4473E	U.S. Patent No. 7,027,782 to Moon, et al. (“Moon”)	October 18, 2002
F9-577F F9-348F F9-809F	U.S. Patent No. 7,600,172 to Berens, et al. (“Berens”)	December 3, 2004, or, in the alternative, December 2, 2005

⁵ Nokia Defendants reserve the right to identify additional bases for qualification as prior art for each of the identified references in the event that it is determined that the Asserted Patents are not entitled to the claimed priority date.

Exhibits	Primary Prior Art	Date⁵
F9-4473F F9-411B		
F9-577G F9-348G F9-809G F9-4473G F9-411A	ITU-T Recommendation G.993.1 (6/2004) ("G.993.1")	June 2004
F9-577H F9-348H F9-809H F9-4473H	HomePlug AV White Paper ("HPAV")	August 18, 2005
F9-577I F9-348I F9-809I F9-4473I F9-411C	U.S. Patent No. 8,775,890 to Yap, et al. ("Yap")	September 13, 2004
F9-577J F9-348J F9-809J F9-4473J	U.S. Patent Application Publication No. 2007/0198898 to Ysebaert, et al. ("Ysebaert")	February 7, 2006
F9-411D	Wireless Video Transport Using Conditional Retransmission and Low-Delay Interleaving" by Aramvith et. al., ("Aramvith")	June 2002
F9-411E	3GPP TS 25.401 v.6.0.0 ("TS 25.401") and 3GPP TR 25.896 v6.0.0 ("TR 25.896")	March 26, 2003

Exhibits	Primary Prior Art	Date⁵
F9-055A	ETSI TS 125 322 v 4.0.0 (2001-03) (“TS 125 322”)	March 2003
F9-055B	EP 1,507,353 A2 to Kawakami et al. (“Kawakami”)	February 16, 2005
F9-055C	U.S. Patent No. 8,644,341 to Petranovich (“Petranovich”)	September 24, 2004
F9-055D	EP 1,168,759 to Yi et al. (“Yi”)	January 2, 2002

To the extent any item of prior art cited above is deemed not to disclose and/or render obvious, explicitly or inherently, any limitation of an Asserted Claim of the Family 9 Patents, Nokia Defendants reserve the right to argue that any difference between that prior art and the corresponding patent claim would have been either inherent in the art or obvious to a person of ordinary skill in the art, even if Nokia Defendants have not specifically denoted that the art is to be combined with the knowledge of a person of ordinary skill in the art.

3. The Family 9 Patents Are Obvious Over the Prior Art.

To the extent TQ Delta argues that any limitation of the Asserted Claims of the Family 9 Patents are not explicitly disclosed and/or rendered obvious by an item of prior art identified above and in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809, any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge

of those skilled in the art. The item of prior art would, therefore, render such claims invalid as obvious under 35 U.S.C. § 103.

a) The Claims Are Obvious Over the Primary References in Light of One or More Secondary References.

To the extent the foregoing references are found not to anticipate and/or render obvious the Asserted Claims of the Family 9 Patents, the foregoing references render the Asserted Claims obvious, either alone or in combination with one or more of the other references identified above. One of ordinary skill in the art would have been motivated to combine the various references cited above and herein so as to disclose each and every limitation of the Asserted Claims of the Family 9 Patents.

Prior art references rendering the Asserted Claims of the Family 9 Patents obvious, either alone or in combination with other references in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809, are provided in the tables above below and in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809. The prior art identified in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J render one or more asserted claims of the Family 9 Patents obvious when the references are read in combination with one or more of each other, when read in combination with any of the prior art identified in Exhibits F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809, and/or when read in view of the state of the art and knowledge of those skilled in the art.

F9 Secondary Exhibits	Date
“Comparison between Interleaving and Multiple DMT Symbols per RS Codeword in ADSL Systems” by Nedev et. Al., IEEE (“Nedev”)	2002
U.S. Patent No. 7,058,085 to Earnshaw (“Earnshaw”)	March 14, 2001
U.S. Patent No. 7,272,768 to Chang (“Chang”)	June 16, 2003, or in the alternative, December 9, 2002, or in the alternative June 24, 2004
U.S. Patent No. 6,865,233 to Eriksson (“Eriksson”)	February 19, 1999
ITU-T G992.3 (01-2005) (“G.992.3”)	January 2005
U.S. Patent No. 7,027,782 to Moon, et al. (“Moon”)	October 18, 2002
U.S. Patent Application Publication No. 2007/0198898 to Ysebaert, et al. (“Ysebaert”)	February 7, 2006
U.S. Patent Application Publication No. 2005/0254508 to Aksu et al. (“Aksu”)	May 13, 2004, or, in the alternative, November 17, 2005
ETSI TS 101 270-2 v.1.2.1 (2003-07) (“TS 101 270”)	July 2003
ITU-T G.993.1 (06-2004) (“G.993.1”)	June 2004
U.S. Patent No. 5,828,677 to Sayeed et al. (“Sayeed”)	October 27, 1998
U.S. Patent No. 6,480,976 to Pan et al. (“Pan”)	Nov. 12, 2002

F9 Secondary Exhibits	Date
U.S. Patent Publication No. 2005/0210355 A1 to Itoh et al. (“Itoh”)	September 22, 2005

To the extent TQ Delta argues that any Asserted Claim of the Family 9 Patents is not disclosed or rendered obvious by any Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J reference, the Asserted Claims nevertheless would have been obvious in light of one or more other Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J references and/or one or more references identified and charted in Exhibits F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809 and in view of the knowledge, experience, and understanding of persons of ordinary skill in the art.

Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with another to render obvious (and therefore invalid) each of TQ Delta’s Asserted Claims. Nokia Defendants may rely on a subset of (or all of) the above-identified references, including all references in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809, for purposes of obviousness depending on the Court’s claim construction, positions taken by TQ Delta during this litigation, and further investigation and discovery.

b) Exemplary Combinations of the Prior Art.

The table below provides an identification of exemplary combinations of prior art references that, based on Nokia Defendants' present understanding of TQ Delta's Preliminary Infringement Contentions and apparent reading of the Asserted Claims, render obvious one or more of the Asserted Claims of the Family 9 Patents. The combinations of references identified below are non-exhaustive, and additional examples are apparent from other combinations of references addressed in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809. Nokia Defendants expressly note that, although certain references charted in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J are listed variously in the left or right column below, Nokia Defendants do not thereby imply any restriction as to which Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J reference is primary and which Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J reference is secondary in such a combination. Nokia Defendants reserve the right to rely on either identified reference in the identified combinations as a primary and/or secondary reference.

Reference	Combination References
“Interleaved FEC/ARQ coding for QoS multicast over the Internet” by Chen et al., (“Chen”)	Eriksson, G.992.3, Kohno, Moon, Berens, G.993.1, HPAV, YAP, Ysebaert, and/or one or more references charted in Exhibits F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809
U.S. Patent No. 6,865,233 to Eriksson (“Eriksson”)	Chen, G.992.3, Kohno, Moon, Berens, G.993.1, HPAV, YAP, Ysebaert, and/or one or more references charted in Exhibits F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809
ITU-T Recommendation G.992.3 (01/2005) (“G.992.3”)	Chen, Eriksson, Kohno, Moon, Berens, G.993.1, HPAV, YAP, Ysebaert, and/or one or more references charted in Exhibits F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809
U.S. Patent No. 7,502,818 to Kohno et al. (“Kohno”)	Chen, Eriksson, G.992.3, Moon, Berens, G.993.1, HPAV, YAP, Ysebaert, and/or one or more references charted in Exhibits F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809
U.S. Patent No. 7,027,782 to Moon, et al. (“Moon”)	Chen, Eriksson, G.992.3, Kohno, Berens, G.993.1, HPAV, YAP, Ysebaert, and/or one or more references charted in Exhibits F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809
U.S. Patent No. 7,600,172 to Berens, et al. (“Berens”)	Chen, Eriksson, G.992.3, Kohno, Moon, G.993.1, HPAV, YAP, Ysebaert, and/or one or more references charted in Exhibits F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809
ITU-T Recommendation G.993.1 (6/2004) (“G.993.1”)	Chen, Eriksson, G.992.3, Kohno, Moon, Berens, HPAV, YAP, Ysebaert, and/or one or more references charted in Exhibits F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809

HomePlug AV White Paper (“HPAV”)	Chen, Eriksson, G.992.3, Kohno, Moon, Berens, G.993.1, YAP, Ysebaert, and/or one or more references charted in Exhibits F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809
U.S. Patent No. 8,775,890 to Yap, et al. (“Yap”)	Chen, Eriksson, G.992.3, Kohno, Moon, Berens, G.993.1, HPAV, Ysebaert, and/or one or more references charted in Exhibits F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809
U.S. Patent Application Publication No. 2007/0198898 to Ysebaert, et al. (“Ysebaert”)	Chen, Eriksson, G.992.3, Kohno, Moon, Berens, G.993.1, HPAV, YAP, and/or one or more references charted in Exhibits F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809
ETSI TS 125 322 v 4.0.0 (2001-03) (“TS 125 322”)	Kawakami, Petranovich, Yi, and/or one or more references charted in Exhibit F9 Secondary-055
EP 1,507,353 A2 to Kawakami et al. (“Kawakami”)	TS 125 322, Petranovich, Yi, and/or one or more references charted in Exhibit F9 Secondary-055
U.S. Patent No. 8,644,341 to Petranovich (“Petranovich”)	TS 125 322, Kawakami, Yi, and/or one or more references charted in Exhibit F9 Secondary-055
EP 1,168,759 to Yi et al. (“Yi”)	TS 125 322, Kawakami, Petranovich, and/or one or more references charted in Exhibit F9 Secondary-055
U.S. Patent No. 7,600,172 to Berens, et al. (“Berens”)	G.993.1, Yap, Aramvith, TR25.896 and TS25.401, and/or one or more references charted in Exhibit F9 Secondary-411
U.S. Patent No. 8,775,890 to Yap, et al. (“Yap”)	G.993.1, Berens, Aramvith, TR25.896 and TS25.401, and/or one or more references charted in Exhibit F9 Secondary-411
ITU-T Recommendation G.993.1 (6/2004) (“G.993.1”)	Berens, Yap, Aramvith, TR25.896 and TS25.401, and/or one or more references charted in Exhibit F9 Secondary-411

Wireless Video Transport Using Conditional Retransmission and Low-Delay Interleaving” by Aramvith et. al., (“Aramvith”)	G.993.1, Berens, Yap, TR25.896 and TS25.401, and/or one or more references charted in Exhibit F9 Secondary-411
3GPP TS 25.401 v.6.0.0 (“TS 25.401”) and 3GPP TR 25.896 v6.0.0 (“TR 25.896”)	G.993.1, Berens, Yap, Aramvith, and/or one or more references charted in Exhibit F9 Secondary-411

It would have been obvious to combine these references for reasons that are readily apparent to one of ordinary skill in the art, and for reasons explained herein.

c) Prior Art Solutions for the ’557, ’348, ’809, and ’4473 Patents

In addition to the exemplary combinations provided above, to the extent TQ Delta alleges the references in F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 do not disclose any particular limitation of the Asserted Claims of the Family 9 Patents, either expressly or inherently, it would have been obvious to a person of ordinary skill in the art as of the alleged invention date of the Family 9 Patents to modify the references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 and/or combine the teachings of the references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with the other prior art references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 in a manner that would have rendered the Asserted Claims invalid as obvious. Nokia Defendants provide examples of such combinations below. The exemplary combinations below are non-exhaustive, and Nokia Defendants reserve the right to rely on additional combinations as may be apparent from the prior art references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-

4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809. These obviousness combinations should not be construed to suggest that any reference included in any combination is not anticipatory in its own right.

(1) Exemplary Chen Solutions

A person of ordinary skill in the art would be motivated to combine Chen with Eriksson for many reasons. For example, Chen describes an “interleaved FEC/ARQ error correction scheme.” *See, e.g.*, Chen at 159, col. 2, ¶ 2. A person having ordinary skill in the art would have been motivated to modify the method of Chen to implement the details of “control signalling for systems” taught by Eriksson because, it is also directed at “handl[ing] erroneously received information” in a data transmission system Eriksson at 2:26-27. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the ability to “aid a receiver to correct the erroneously received information, e.g., forward error correction (FEC) techniques, and those which enable the erroneously received information to be retransmitted to the receiver, e.g., automatic re-transmission (ARQ) techniques.” Eriksson at 2:19-24. In addition, a person of ordinary skill in the art would be motivated to combine Chen with Eriksson because (a) Chen and Eriksson disclose similar products, such as methods to reduce error in data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods or systems for the improvement of data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Eriksson’s teachings with those of Chen. For similar reasons, a person of ordinary skill in the art would be motivated to combine Chen with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Chen with G.992.3 for many reasons. For example, Chen describes an “interleaved FEC/ARQ error correction scheme.” *See, e.g.*, Chen at 159, col. 2, ¶ 2. A person having ordinary skill in the art would have been motivated to modify the method of Chen to implement the details of “data rate versus loop reach performance, loop diagnostics, deployment from remote cabinets, spectrum control, power control, robustness against loop impairments and RFI, and operations and maintenance” taught by G.992.3 because, it is also directed at improvements in transmission of data over DSL. G.992.3 at ii, Summary. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “error control.” G.992.3 at i, Summary. In addition, a person of ordinary skill in the art would be motivated to combine Chen with G.992.3 because (a) Chen and G.992.3 disclose similar products, such as improvements in the operation of data transmission; (b) G.992.3 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.992.3’s teachings with those of Chen. For similar reasons, a person of ordinary skill in the art would be motivated to combine Chen with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Chen with Kohno for many reasons. For example, Chen describes an “interleaved FEC/ARQ error correction scheme.” *See, e.g.*, Chen at 159, col. 2, ¶ 2. A person having ordinary skill in the art would have been motivated to modify the method of Chen to implement the details of a data communications system

“to dynamically change the error processing between an ARQ function and an FEC function in accordance with the network status” taught by Kohno because, it is also directed at “error control.” Kohno at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “dynamic error correction control” based on the characteristics present in the system. *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Chen with Kohno because (a) Chen and Kohno disclose similar products, such as data communications systems, data senders, data receivers, data communications methods, and computer programs; (b) Kohno is assigned to Sony Corporation, a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in data communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kohno’s teachings with those of Chen. For similar reasons, a person of ordinary skill in the art would be motivated to combine Chen with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Chen with Moon for many reasons. For example, Chen describes an “interleaved FEC/ARQ error correction scheme.” *See, e.g.,* Chen at 159, col. 2, ¶ 2. A person having ordinary skill in the art would have been motivated to modify the method of Chen to implement the details of “an apparatus for efficiently transmitting and receiving high-speed data” using channel interleavers taught by Moon because, it is also directed at error correction. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “higher reception probability.” Moon at 8:18-37.

In addition, a person of ordinary skill in the art would be motivated to combine Chen with Moon because (a) Chen and Moon disclose similar products, such as improved data transmission/reception systems; (b) Moon is assigned to Samsung Electronics Co., Ltd., a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to high-speed data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Moon's teachings with those of Chen. For similar reasons, a person of ordinary skill in the art would be motivated to combine Chen with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Chen with Berens for many reasons. For example, Chen describes an "interleaved FEC/ARQ error correction scheme." *See, e.g.*, Chen at 159, col. 2, ¶ 2. A person having ordinary skill in the art would have been motivated to modify the method of Chen to implement the details of the "ARQ scheme" taught by Berens because, it is also directed at "an error free transmission of data packets." Berens at 1:23-25. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the simplified and improved implementation. Berens at 1:66-2:3. In addition, a person of ordinary skill in the art would be motivated to combine Chen with Berens because (a) Chen and Berens disclose similar products, such as improved wireless communication systems and wireline systems; (b) Berens is assigned to STMicroelectronics, a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate

to systems of data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Berens's teachings with those of Chen. For similar reasons, a person of ordinary skill in the art would be motivated to combine Chen with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Chen with G.993.1 for many reasons. For example, Chen describes an “interleaved FEC/ARQ error correction scheme.” *See, e.g.*, Chen at 159, col. 2, ¶ 2. A person having ordinary skill in the art would have been motivated to modify the method of Chen to implement the details of “interleaving . . . used to protect the data against bursts of errors” taught by G.993.1 because, it is also directed at error correction. G.993.1 at 15. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “error correction ability.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Chen with G.993.1 because (a) Chen and G.993.1 disclose similar products, such as improvements in the operation of DSL transmission over wire pairs; (b) G.993.1 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.993.1's teachings with those of Chen. For similar reasons, a person of ordinary skill in the art would be motivated to combine Chen with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Chen with HPAV for many reasons. For example, Chen describes an “interleaved FEC/ARQ error correction scheme.” *See, e.g.*, Chen at 159, col. 2, ¶ 2. A person having ordinary skill in the art would have been motivated to modify the method of Chen to implement the details of “high-quality, multi-stream entertainment oriented networking over existing AC wiring” taught by HPAV because, it is also directed at “highly efficient” and reliable data transmission. HPAV at 2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “best connectivity at the highest QoS” “at a cost that is competitive with other competing technologies.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Chen with HPAV because (a) Chen and HPAV disclose similar products, such as systems for efficient data transmission and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to data transmission and receiving. Moreover, a POSITA would have had a reasonable expectation of success in incorporating HPAV’s teachings with those of Chen. For similar reasons, a person of ordinary skill in the art would be motivated to combine Chen with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Chen with Yap for many reasons. For example, Chen describes an “interleaved FEC/ARQ error correction scheme.” *See, e.g.*, Chen at 159, col. 2, ¶ 2. A person having ordinary skill in the art would have been motivated to modify the method of Chen to implement the details of “[a]n automatic retransmission control system” taught by Yap because, it is also directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person of ordinary skill in the art would be motivated

by the advantages of such functionality, such as the “improv[ed] accuracy in the retransmission of signals and reducing the number of retransmission requests.” Yap at 2:18-27. In addition, a person of ordinary skill in the art would be motivated to combine Chen with Yap because (a) Chen and Yap disclose similar products, such as a system and method for data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yap’s teachings with those of Chen. For similar reasons, a person of ordinary skill in the art would be motivated to combine Chen with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Chen with Ysebaert for many reasons. For example, Chen describes an “interleaved FEC/ARQ error correction scheme.” *See, e.g.*, Chen at 159, col. 2, ¶ 2. A person having ordinary skill in the art would have been motivated to modify the method of Chen to implement the details of the “device and method for mitigating effects of impulse noise on data packet transfer” taught by Ysebaert because, it is also directed at error mitigation. Ysebaert at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “effects of impulse noise.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Chen with Ysebaert because (a) Chen and Ysebaert disclose similar products, such as devices and methods for data transmission; (b) Ysebaert was assigned to Alcatel Lucent., a leader to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable

expectation of success in incorporating Ysebaert's teachings with those of Chen. For similar reasons, a person of ordinary skill in the art would be motivated to combine Chen with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

(2) Exemplary Eriksson Solutions

A person of ordinary skill in the art would be motivated to combine Eriksson with Chen for many reasons. For example, Eriksson describes a “control signalling for systems” directed at “handl[ing] erroneously received information” in a data transmission system. Eriksson at 2:26-27. A person having ordinary skill in the art would have been motivated to modify the method of Chen to implement the details of “interleaved FEC/ARQ error correction scheme” taught by Chen because, it is also directed at error correction. Chen at 159, col. 2, ¶ 2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for “error and loss control over the Internet.” Chen at 159, col. 1, ¶ 1. In addition, a person of ordinary skill in the art would be motivated to combine Eriksson with Chen because (a) Eriksson and Chen disclose similar products, such as methods to reduce error in data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods or systems for the improvement of data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Chen's teachings with those of Eriksson. For similar reasons, a person of ordinary skill in the art would be motivated to combine Eriksson with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Eriksson with G.992.3 for many reasons. For example, Eriksson describes a “control signalling for systems” directed at “handl[ing] erroneously received information” in a data transmission system. Eriksson at 2:26-27. A person having ordinary skill in the art would have been motivated to modify the method of Eriksson to implement the details of “data rate versus loop reach performance, loop diagnostics, deployment from remote cabinets, spectrum control, power control, robustness against loop impairments and RFI, and operations and maintenance” taught by G.992.3 because, it is also directed at improvements in transmission of data over DSL. G.992.3 at ii, Summary. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “error control.” G.992.3 at i, Summary. In addition, a person of ordinary skill in the art would be motivated to combine Eriksson with G.992.3 because (a) Eriksson and G.992.3 disclose similar products, such as improvements in the operation of data transmission; (b) G.992.3 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.992.3’s teachings with those of Eriksson. For similar reasons, a person of ordinary skill in the art would be motivated to combine Eriksson with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Eriksson with Kohno for many reasons. For example, Eriksson describes a “control signalling for systems” directed at “handl[ing] erroneously received information” in a data transmission system. Eriksson at 2:26-27.

A person having ordinary skill in the art would have been motivated to modify the method of Eriksson to implement the details of a data communications system “to dynamically change the error processing between an ARQ function and an FEC function in accordance with the network status” taught by Kohno because, it is also directed at “error control.” Kohno at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “dynamic error correction control” based on the characteristics present in the system. *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Eriksson with Kohno because (a) Eriksson and Kohno disclose similar products, such as data communications systems, data senders, data receivers, data communications methods, and computer programs; (b) Kohno is assigned to Sony Corporation, a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in data communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kohno’s teachings with those of Eriksson. For similar reasons, a person of ordinary skill in the art would be motivated to combine Eriksson with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Eriksson with Moon for many reasons. For example, Eriksson describes a “control signalling for systems” directed at “handl[ing] erroneously received information” in a data transmission system. Eriksson at 2:26-27. A person having ordinary skill in the art would have been motivated to modify the method of Eriksson to implement the details of “an apparatus for efficiently transmitting and receiving high-speed data” using channel interleavers taught by Moon because, it is also directed at error

correction. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “higher reception probability.” Moon at 8:18-37. In addition, a person of ordinary skill in the art would be motivated to combine Eriksson with Moon because (a) Eriksson and Moon disclose similar products, such as improved data transmission/reception systems; (b) Moon is assigned to Samsung Electronics Co., Ltd., a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to high-speed data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Moon’s teachings with those of Eriksson. For similar reasons, a person of ordinary skill in the art would be motivated to combine Eriksson with other references in Exhibits F9-577A-F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Eriksson with Berens for many reasons. For example, Eriksson describes a “control signalling for systems” directed at “handl[ing] erroneously received information” in a data transmission system. Eriksson at 2:26-27. A person having ordinary skill in the art would have been motivated to modify the method of Eriksson to implement the details of the “ARQ scheme” taught by Berens because, it is also directed at “an error free transmission of data packets.” Berens at 1:23-25. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the simplified and improved implementation. Berens at 1:66-2:3. In addition, a person of ordinary skill in the art would be motivated to combine Eriksson with Berens because (a) Eriksson and Berens disclose similar products, such as improved wireless communication systems and wireline systems; (b) Berens is assigned to STMicroelectronics, a player in the industry to which a person of ordinary

skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to systems of data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Berens's teachings with those of Eriksson. For similar reasons, a person of ordinary skill in the art would be motivated to combine Eriksson with other references in Exhibits F9-577A-F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Eriksson with G.993.1 for many reasons. For example, Eriksson describes a “control signalling for systems” directed at “handl[ing] erroneously received information” in a data transmission system. Eriksson at 2:26-27. A person having ordinary skill in the art would have been motivated to modify the method of Eriksson to implement the details of “interleaving . . . used to protect the data against bursts of errors” taught by G.993.1 because, it is also directed at error correction. G.993.1 at 15. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “error correction ability.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Eriksson with G.993.1 because (a) Eriksson and G.993.1 disclose similar products, such as improvements in the operation of DSL transmission over wire pairs; (b) G.993.1 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.993.1's teachings with those of Eriksson. For similar reasons, a person of ordinary skill in the art would be motivated to combine Eriksson with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-

4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Eriksson with HPAV for many reasons. For example, Eriksson describes a “control signalling for systems” directed at “handl[ing] erroneously received information” in a data transmission system. Eriksson at 2:26-27. A person having ordinary skill in the art would have been motivated to modify the method of Eriksson to implement the details of “high-quality, multi-stream entertainment oriented networking over existing AC wiring” taught by HPAV because, it is also directed at “highly efficient” and reliable data transmission. HPAV at 2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “best connectivity at the highest QoS” “at a cost that is competitive with other competing technologies.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Eriksson with HPAV because (a) Eriksson and HPAV disclose similar products, such as systems for efficient data transmission and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to data transmission and receiving. Moreover, a POSITA would have had a reasonable expectation of success in incorporating HPAV’s teachings with those of Eriksson. For similar reasons, a person of ordinary skill in the art would be motivated to combine Eriksson with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Eriksson with Yap for many reasons. For example, Eriksson describes a “control signalling for systems” directed at “handl[ing] erroneously received information” in a data transmission system. Eriksson at 2:26-27.

A person having ordinary skill in the art would have been motivated to modify the method of Eriksson to implement the details of “[a]n automatic retransmission control system” taught by Yap because, it is also directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “improv[ed] accuracy in the retransmission of signals and reducing the number of retransmission requests.” Yap at 2:18-27. In addition, a person of ordinary skill in the art would be motivated to combine Eriksson with Yap because (a) Eriksson and Yap disclose similar products, such as a system and method for data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yap’s teachings with those of Eriksson. For similar reasons, a person of ordinary skill in the art would be motivated to combine Eriksson with other references in Exhibits F9-577A-F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Eriksson with Ysebaert for many reasons. For example, Eriksson describes a “control signalling for systems” directed at “handl[ing] erroneously received information” in a data transmission system. Eriksson at 2:26-27. A person having ordinary skill in the art would have been motivated to modify the method of Eriksson to implement the details of the “device and method for mitigating effects of impulse noise on data packet transfer” taught by Ysebaert because, it is also directed at error mitigation. Ysebaert at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “effects of impulse noise.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Eriksson with Ysebaert because (a) Eriksson and

Ysebaert disclose similar products, such as devices and methods for data transmission; (b) Ysebaert was assigned to Alcatel Lucent., a leader to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ysebaert's teachings with those of Eriksson. For similar reasons, a person of ordinary skill in the art would be motivated to combine Eriksson with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

(3) Exemplary ITU-T G.992.3 Solutions

A person of ordinary skill in the art would be motivated to combine G.992.3 with Chen for many reasons. For example, G.992.3 describes a “data rate versus loop reach performance, loop diagnostics, deployment from remote cabinets, spectrum control, power control, robustness against loop impairments and RFI, and operations and maintenance.” G.992.3 at ii, Summary. A person having ordinary skill in the art would have been motivated to modify the method of Chen to implement the details of “interleaved FEC/ARQ error correction scheme” taught by Chen because, it is also directed at error correction. Chen at 159, col. 2, ¶ 2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for “error and loss control over the Internet.” Chen at 159, col. 1, ¶ 1. In addition, a person of ordinary skill in the art would be motivated to combine G.992.3 with Chen because (a) G.992.3 and Chen disclose similar products, such as methods to reduce error in data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods or systems for the improvement of data transmission technology. Moreover, a POSITA would have

had a reasonable expectation of success in incorporating Chen's teachings with those of G.992.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.992.3 with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.992.3 with Eriksson for many reasons. For example, G.992.3 describes a “data rate versus loop reach performance, loop diagnostics, deployment from remote cabinets, spectrum control, power control, robustness against loop impairments and RFI, and operations and maintenance.” G.992.3 at ii, Summary. A person having ordinary skill in the art would have been motivated to modify the method of G.992.3 to implement the details of “control signalling for systems” taught by Eriksson because, it is also directed at “handl[ing] erroneously received information” in a data transmission system Eriksson at 2:26-27. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the ability to “aid a receiver to correct the erroneously received information, e.g., forward error correction (FEC) techniques, and those which enable the erroneously received information to be retransmitted to the receiver, e.g., automatic re-transmission (ARQ) techniques.” Eriksson at 2:19-24. In addition, a person of ordinary skill in the art would be motivated to combine G.992.3 with Eriksson because (a) G.992.3 and Eriksson disclose similar products, such as methods to reduce error in data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods or systems for the improvement of data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Eriksson's teachings with those of G.992.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.992.3 with other references in

Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.992.3 with Kohno for many reasons. For example, G.992.3 describes a “data rate versus loop reach performance, loop diagnostics, deployment from remote cabinets, spectrum control, power control, robustness against loop impairments and RFI, and operations and maintenance.” G.992.3 at ii, Summary. A person having ordinary skill in the art would have been motivated to modify the method of G.992.3 to implement the details of a data communications system “to dynamically change the error processing between an ARQ function and an FEC function in accordance with the network status” taught by Kohno because, it is also directed at “error control.” Kohno at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “dynamic error correction control” based on the characteristics present in the system. *Id.* In addition, a person of ordinary skill in the art would be motivated to combine G.992.3 with Kohno because (a) G.992.3 and Kohno disclose similar products, such as data communications systems, data senders, data receivers, data communications methods, and computer programs; (b) Kohno is assigned to Sony Corporation, a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in data communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kohno’s teachings with those of G.992.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.992.3 with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.992.3 with Moon for many reasons. For example, G.992.3 describes a “data rate versus loop reach performance, loop diagnostics, deployment from remote cabinets, spectrum control, power control, robustness against loop impairments and RFI, and operations and maintenance.” G.992.3 at ii, Summary. A person having ordinary skill in the art would have been motivated to modify the method of G.992.3 to implement the details of “an apparatus for efficiently transmitting and receiving high-speed data” using channel interleavers taught by Moon because, it is also directed at error correction. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “higher reception probability.” Moon at 8:18-37. In addition, a person of ordinary skill in the art would be motivated to combine G.992.3 with Moon because (a) G.992.3 and Moon disclose similar products, such as improved data transmission/reception systems; (b) Moon is assigned to Samsung Electronics Co., Ltd., a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to high-speed data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Moon’s teachings with those of G.992.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.992.3 with other references in Exhibits F9-577A-F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.992.3 with Berens for many reasons. For example, G.992.3 describes a “data rate versus loop reach performance, loop diagnostics, deployment from remote cabinets, spectrum control, power control, robustness against loop impairments and RFI, and operations and maintenance.” G.992.3 at ii, Summary. A

person having ordinary skill in the art would have been motivated to modify the method of G.992.3 to implement the details of the “ARQ scheme” taught by Berens because, it is also directed at “an error free transmission of data packets.” Berens at 1:23-25. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the simplified and improved implementation. Berens at 1:66-2:3. In addition, a person of ordinary skill in the art would be motivated to combine G.992.3 with Berens because (a) G.992.3 and Berens disclose similar products, such as improved wireless communication systems and wireline systems; (b) Berens is assigned to STMicroelectronics, a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to systems of data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Berens’s teachings with those of G.992.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.992.3 with other references in Exhibits F9-577A-F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.992.3 with G.993.1 for many reasons. For example, G.992.3 describes a “data rate versus loop reach performance, loop diagnostics, deployment from remote cabinets, spectrum control, power control, robustness against loop impairments and RFI, and operations and maintenance.” G.992.3 at ii, Summary. A person having ordinary skill in the art would have been motivated to modify the method of G.992.3 to implement the details of “interleaving . . . used to protect the data against bursts of errors” taught by G.993.1 because, it is also directed at error correction. G.993.1 at 15. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “error correction

ability.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine G.992.3 with G.993.1 because (a) G.992.3 and G.993.1 disclose similar products, such as improvements in the operation of DSL transmission over wire pairs; (b) G.993.1 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.993.1’s teachings with those of G.992.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.992.3 with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.992.3 with HPAV for many reasons. For example, G.992.3 describes a “data rate versus loop reach performance, loop diagnostics, deployment from remote cabinets, spectrum control, power control, robustness against loop impairments and RFI, and operations and maintenance.” G.992.3 at ii, Summary. A person having ordinary skill in the art would have been motivated to modify the method of G.992.3 to implement the details of “high-quality, multi-stream entertainment oriented networking over existing AC wiring” taught by HPAV because, it is also directed at “highly efficient” and reliable data transmission. HPAV at 2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “best connectivity at the highest QoS” “at a cost that is competitive with other competing technologies.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine G.992.3 with HPAV because (a) G.992.3 and HPAV disclose similar products, such as systems for efficient data transmission and (b) both references are

analogous art and in the same field of endeavor as each other, for example, both relate to data transmission and receiving. Moreover, a POSITA would have had a reasonable expectation of success in incorporating HPAV's teachings with those of G.992.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.992.3 with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.992.3 with Yap for many reasons. For example, G.992.3 describes a “data rate versus loop reach performance, loop diagnostics, deployment from remote cabinets, spectrum control, power control, robustness against loop impairments and RFI, and operations and maintenance.” G.992.3 at ii, Summary. A person having ordinary skill in the art would have been motivated to modify the method of G.992.3 to implement the details of “[a]n automatic retransmission control system” taught by Yap because, it is also directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “improv[ed] accuracy in the retransmission of signals and reducing the number of retransmission requests.” Yap at 2:18-27. In addition, a person of ordinary skill in the art would be motivated to combine G.992.3 with Yap because (a) G.992.3 and Yap disclose similar products, such as a system and method for data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yap's teachings with those of G.992.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.992.3 with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-

4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.992.3 with Ysebaert for many reasons. For example, G.992.3 describes a “data rate versus loop reach performance, loop diagnostics, deployment from remote cabinets, spectrum control, power control, robustness against loop impairments and RFI, and operations and maintenance.” G.992.3 at ii, Summary. A person having ordinary skill in the art would have been motivated to modify the method of G.992.3 to implement the details of the “device and method for mitigating effects of impulse noise on data packet transfer” taught by Ysebaert because, it is also directed at error mitigation. Ysebaert at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “effects of impulse noise.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine G.992.3 with Ysebaert because (a) G.992.3 and Ysebaert disclose similar products, such as devices and methods for data transmission; (b) Ysebaert was assigned to Alcatel Lucent., a leader to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ysebaert’s teachings with those of G.992.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.992.3 with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

(4) Exemplary Kohno Solutions

A person of ordinary skill in the art would be motivated to combine Kohno with Chen for many reasons. For example, Kohno describes a method “to dynamically change the error processing between an ARQ function and an FEC function in accordance with the network status.” Kohno at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Chen to implement the details of “interleaved FEC/ARQ error correction scheme” taught by Chen because, it is also directed at error correction. Chen at 159, col. 2, ¶ 2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for “error and loss control over the Internet.” Chen at 159, col. 1, ¶ 1. In addition, a person of ordinary skill in the art would be motivated to combine Kohno with Chen because (a) Kohno and Chen disclose similar products, such as methods to reduce error in data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods or systems for the improvement of data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Chen’s teachings with those of Kohno. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kohno with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kohno with Eriksson for many reasons. For example, Kohno describes a method “to dynamically change the error processing between an ARQ function and an FEC function in accordance with the network status.” Kohno at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Kohno to implement the details of “control signalling for systems” taught by

Eriksson because, it is also directed at “handl[ing] erroneously received information” in a data transmission system Eriksson at 2:26-27. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the ability to “aid a receiver to correct the erroneously received information, e.g., forward error correction (FEC) techniques, and those which enable the erroneously received information to be retransmitted to the receiver, e.g., automatic re-transmission (ARQ) techniques.” Eriksson at 2:19-24. In addition, a person of ordinary skill in the art would be motivated to combine Kohno with Eriksson because (a) Kohno and Eriksson disclose similar products, such as methods to reduce error in data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods or systems for the improvement of data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Eriksson’s teachings with those of Kohno. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kohno with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kohno with G.992.3 for many reasons. For example, Kohno describes a method “to dynamically change the error processing between an ARQ function and an FEC function in accordance with the network status.” Kohno at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Kohno to implement the details of “data rate versus loop reach performance, loop diagnostics, deployment from remote cabinets, spectrum control, power control, robustness against loop impairments and RFI, and operations and maintenance” taught by G.992.3 because, it is also directed at improvements in transmission of data over DSL. G.992.3 at ii, Summary. A person of

ordinary skill in the art would be motivated by the advantages of such functionality, such as the “error control.” G.992.3 at i, Summary. In addition, a person of ordinary skill in the art would be motivated to combine Kohno with G.992.3 because (a) Kohno and G.992.3 disclose similar products, such as improvements in the operation of data transmission; (b) G.992.3 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.992.3’s teachings with those of Kohno. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kohno with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kohno with Moon for many reasons. For example, Kohno describes a method “to dynamically change the error processing between an ARQ function and an FEC function in accordance with the network status.” Kohno at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Kohno to implement the details of “an apparatus for efficiently transmitting and receiving high-speed data” using channel interleavers taught by Moon because, it is also directed at error correction. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “higher reception probability.” Moon at 8:18-37. In addition, a person of ordinary skill in the art would be motivated to combine Kohno with Moon because (a) Kohno and Moon disclose similar products, such as improved data transmission/reception systems; (b) Moon is assigned to Samsung Electronics Co., Ltd., a player in the industry to which a person

of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to high-speed data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Moon's teachings with those of Kohno. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kohno with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kohno with Berens for many reasons. For example, Kohno describes a method “to dynamically change the error processing between an ARQ function and an FEC function in accordance with the network status.” Kohno at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Kohno to implement the details of the “ARQ scheme” taught by Berens because, it is also directed at “an error free transmission of data packets.” Berens at 1:23-25. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the simplified and improved implementation. Berens at 1:66-2:3. In addition, a person of ordinary skill in the art would be motivated to combine Kohno with Berens because (a) Kohno and Berens disclose similar products, such as improved wireless communication systems and wireline systems; (b) Berens is assigned to STMicroelectronics, a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to systems of data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Berens's teachings with those of Kohno. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kohno with other references in Exhibits

F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kohno with G.993.1 for many reasons. For example, Kohno describes a method “to dynamically change the error processing between an ARQ function and an FEC function in accordance with the network status.” Kohno at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Kohno to implement the details of “interleaving . . . used to protect the data against bursts of errors” taught by G.993.1 because, it is also directed at error correction. G.993.1 at 15. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “error correction ability.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Kohno with G.993.1 because (a) Kohno and G.993.1 disclose similar products, such as improvements in the operation of DSL transmission over wire pairs; (b) G.993.1 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.993.1’s teachings with those of Kohno. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kohno with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kohno with HPAV for many reasons. For example, Kohno describes a method “to dynamically change the error processing between an ARQ function and an FEC function in accordance with the network status.”

Kohno at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Kohno to implement the details of “high-quality, multi-stream entertainment oriented networking over existing AC wiring” taught by HPAV because, it is also directed at “highly efficient” and reliable data transmission. HPAV at 2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “best connectivity at the highest QoS” “at a cost that is competitive with other competing technologies.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Kohno with HPAV because (a) Kohno and HPAV disclose similar products, such as systems for efficient data transmission and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to data transmission and receiving. Moreover, a POSITA would have had a reasonable expectation of success in incorporating HPAV’s teachings with those of Kohno. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kohno with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kohno with Yap for many reasons. For example, Kohno describes a method “to dynamically change the error processing between an ARQ function and an FEC function in accordance with the network status.” Kohno at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Kohno to implement the details of “[a]n automatic retransmission control system” taught by Yap because, it is also directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “improv[ed] accuracy in the retransmission of signals and reducing the

number of retransmission requests.” Yap at 2:18-27. In addition, a person of ordinary skill in the art would be motivated to combine Kohno with Yap because (a) Kohno and Yap disclose similar products, such as a system and method for data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yap’s teachings with those of Kohno. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kohno with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kohno with Ysebaert for many reasons. For example, Kohno describes a method “to dynamically change the error processing between an ARQ function and an FEC function in accordance with the network status.” Kohno at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Kohno to implement the details of the “device and method for mitigating effects of impulse noise on data packet transfer” taught by Ysebaert because, it is also directed at error mitigation. Ysebaert at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “effects of impulse noise.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Kohno with Ysebaert because (a) Kohno and Ysebaert disclose similar products, such as devices and methods for data transmission; (b) Ysebaert was assigned to Alcatel Lucent., a leader to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in

incorporating Ysebaert's teachings with those of Kohno. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kohno with other references in Exhibits F9-577A-F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

(5) Exemplary Moon Solutions

A person of ordinary skill in the art would be motivated to combine Moon with Chen for many reasons. For example, Moon describes a method “an apparatus for efficiently transmitting and receiving high-speed data” using channel interleavers. Moon at 8:27-31. A person having ordinary skill in the art would have been motivated to modify the method of Chen to implement the details of “interleaved FEC/ARQ error correction scheme” taught by Chen because, it is also directed at error correction. Chen at 159, col. 2, ¶ 2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for “error and loss control over the Internet.” Chen at 159, col. 1, ¶ 1. In addition, a person of ordinary skill in the art would be motivated to combine Moon with Chen because (a) Moon and Chen disclose similar products, such as methods to reduce error in data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods or systems for the improvement of data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Chen's teachings with those of Moon. For similar reasons, a person of ordinary skill in the art would be motivated to combine Moon with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Moon with Eriksson for many reasons. For example, Moon describes a method “an apparatus for efficiently transmitting

and receiving high-speed data” using channel interleavers. Moon at 8:27-31. A person having ordinary skill in the art would have been motivated to modify the method of Moon to implement the details of “control signalling for systems” taught by Eriksson because, it is also directed at “handl[ing] erroneously received information” in a data transmission system Eriksson at 2:26-27. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the ability to “aid a receiver to correct the erroneously received information, e.g., forward error correction (FEC) techniques, and those which enable the erroneously received information to be retransmitted to the receiver, e.g., automatic re-transmission (ARQ) techniques.” Eriksson at 2:19-24. In addition, a person of ordinary skill in the art would be motivated to combine Moon with Eriksson because (a) Moon and Eriksson disclose similar products, such as methods to reduce error in data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods or systems for the improvement of data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Eriksson’s teachings with those of Moon. For similar reasons, a person of ordinary skill in the art would be motivated to combine Moon with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Moon with G.992.3 for many reasons. For example, Moon describes a method “an apparatus for efficiently transmitting and receiving high-speed data” using channel interleavers. Moon at 8:27-31. A person having ordinary skill in the art would have been motivated to modify the method of Moon to implement the details of “data rate versus loop reach performance, loop diagnostics, deployment from remote cabinets, spectrum control, power control, robustness against loop impairments and RFI, and

operations and maintenance” taught by G.992.3 because, it is also directed at improvements in transmission of data over DSL. G.992.3 at ii, Summary. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “error control.” G.992.3 at i, Summary. In addition, a person of ordinary skill in the art would be motivated to combine Moon with G.992.3 because (a) Moon and G.992.3 disclose similar products, such as improvements in the operation of data transmission; (b) G.992.3 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.992.3’s teachings with those of Moon. For similar reasons, a person of ordinary skill in the art would be motivated to combine Moon with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Moon with Kohno for many reasons. For example, Moon describes a method “an apparatus for efficiently transmitting and receiving high-speed data” using channel interleavers. Moon at 8:27-31. A person having ordinary skill in the art would have been motivated to modify the method of Moon to implement the details of a data communications system “to dynamically change the error processing between an ARQ function and an FEC function in accordance with the network status” taught by Kohno because, it is also directed at “error control.” Kohno at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “dynamic error correction control” based on the characteristics present in the system. *Id.* In addition, a person of

ordinary skill in the art would be motivated to combine Moon with Kohno because (a) Moon and Kohno disclose similar products, such as data communications systems, data senders, data receivers, data communications methods, and computer programs; (b) Kohno is assigned to Sony Corporation, a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in data communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kohno's teachings with those of Moon. For similar reasons, a person of ordinary skill in the art would be motivated to combine Moon with other references in Exhibits F9-577A-F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Moon with Berens for many reasons. For example, Moon describes a method “an apparatus for efficiently transmitting and receiving high-speed data” using channel interleavers. Moon at 8:27-31. A person having ordinary skill in the art would have been motivated to modify the method of Moon to implement the details of the “ARQ scheme” taught by Berens because, it is also directed at “an error free transmission of data packets.” Berens at 1:23-25. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the simplified and improved implementation. Berens at 1:66-2:3. In addition, a person of ordinary skill in the art would be motivated to combine Moon with Berens because (a) Moon and Berens disclose similar products, such as improved wireless communication systems and wireline systems; (b) Berens is assigned to STMicroelectronics, a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the

same field of endeavor as each other, for example, both relate to systems of data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Berens's teachings with those of Moon. For similar reasons, a person of ordinary skill in the art would be motivated to combine Moon with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Moon with G.993.1 for many reasons. For example, Moon describes a method “an apparatus for efficiently transmitting and receiving high-speed data” using channel interleavers. Moon at 8:27-31. A person having ordinary skill in the art would have been motivated to modify the method of Moon to implement the details of “interleaving . . . used to protect the data against bursts of errors” taught by G.993.1 because, it is also directed at error correction. G.993.1 at 15. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “error correction ability.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Moon with G.993.1 because (a) Moon and G.993.1 disclose similar products, such as improvements in the operation of DSL transmission over wire pairs, (b) G.993.1 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.993.1's teachings with those of Moon. For similar reasons, a person of ordinary skill in the art would be motivated to combine Moon with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A –

F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Moon with HPAV for many reasons. For example, Moon describes a method “an apparatus for efficiently transmitting and receiving high-speed data” using channel interleavers. Moon at 8:27-31. A person having ordinary skill in the art would have been motivated to modify the method of Moon to implement the details of “high-quality, multi-stream entertainment oriented networking over existing AC wiring” taught by HPAV because, it is also directed at “highly efficient” and reliable data transmission. HPAV at 2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “best connectivity at the highest QoS” “at a cost that is competitive with other competing technologies.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Moon with HPAV because (a) Moon and HPAV disclose similar products, such as systems for efficient data transmission and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to data transmission and receiving. Moreover, a POSITA would have had a reasonable expectation of success in incorporating HPAV’s teachings with those of Moon. For similar reasons, a person of ordinary skill in the art would be motivated to combine Moon with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Moon with Yap for many reasons. For example, Moon describes a method “an apparatus for efficiently transmitting and receiving high-speed data” using channel interleavers. Moon at 8:27-31. A person having ordinary skill in the art would have been motivated to modify the method of Moon to implement

the details of “[a]n automatic retransmission control system” taught by Yap because, it is also directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “improv[ed] accuracy in the retransmission of signals and reducing the number of retransmission requests.” Yap at 2:18-27. In addition, a person of ordinary skill in the art would be motivated to combine Moon with Yap because (a) Moon and Yap disclose similar products, such as a system and method for data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yap’s teachings with those of Moon. For similar reasons, a person of ordinary skill in the art would be motivated to combine Moon with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Moon with Ysebaert for many reasons. For example, Moon describes a method “an apparatus for efficiently transmitting and receiving high-speed data” using channel interleavers. Moon at 8:27-31. A person having ordinary skill in the art would have been motivated to modify the method of Moon to implement the details of the “device and method for mitigating effects of impulse noise on data packet transfer” taught by Ysebaert because, it is also directed at error mitigation. Ysebaert at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “effects of impulse noise.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Moon with Ysebaert because (a) Moon and Ysebaert disclose similar products, such as devices and methods for data transmission; (b) Ysebaert was assigned to

Alcatel Lucent., a leader to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ysebaert's teachings with those of Moon. For similar reasons, a person of ordinary skill in the art would be motivated to combine Moon with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

(6) Exemplary Berens Solutions

A person of ordinary skill in the art would be motivated to combine Berens with Chen for many reasons. For example, Berens describes a method “an error free transmission of data packets.” Berens at 1:23-25. A person having ordinary skill in the art would have been motivated to modify the method of Chen to implement the details of “interleaved FEC/ARQ error correction scheme” taught by Chen because, it is also directed at error correction. Chen at 159, col. 2, ¶ 2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for “error and loss control over the Internet.” Chen at 159, col. 1, ¶ 1. In addition, a person of ordinary skill in the art would be motivated to combine Berens with Chen because (a) Berens and Chen disclose similar products, such as methods to reduce error in data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods or systems for the improvement of data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Chen's teachings with those of Berens. For similar reasons, a person of ordinary skill in the art would be motivated to combine Berens with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-

4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Berens with Eriksson for many reasons. For example, Berens describes a method “an error free transmission of data packets.” Berens at 1:23-25. A person having ordinary skill in the art would have been motivated to modify the method of Berens to implement the details of “control signalling for systems” taught by Eriksson because, it is also directed at “handl[ing] erroneously received information” in a data transmission system Eriksson at 2:26-27. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the ability to “aid a receiver to correct the erroneously received information, e.g., forward error correction (FEC) techniques, and those which enable the erroneously received information to be retransmitted to the receiver, e.g., automatic re-transmission (ARQ) techniques.” Eriksson at 2:19-24. In addition, a person of ordinary skill in the art would be motivated to combine Berens with Eriksson because (a) Berens and Eriksson disclose similar products, such as methods to reduce error in data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods or systems for the improvement of data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Eriksson’s teachings with those of Berens. For similar reasons, a person of ordinary skill in the art would be motivated to combine Berens with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Berens with G.992.3 for many reasons. For example, Berens describes a method “an error free transmission of data

packets.” Berens at 1:23-25. A person having ordinary skill in the art would have been motivated to modify the method of Berens to implement the details of “data rate versus loop reach performance, loop diagnostics, deployment from remote cabinets, spectrum control, power control, robustness against loop impairments and RFI, and operations and maintenance” taught by G.992.3 because, it is also directed at improvements in transmission of data over DSL. G.992.3 at ii, Summary. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “error control.” G.992.3 at i, Summary. In addition, a person of ordinary skill in the art would be motivated to combine Berens with G.992.3 because (a) Berens and G.992.3 disclose similar products, such as improvements in the operation of data transmission; (b) G.992.3 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.992.3’s teachings with those of Berens. For similar reasons, a person of ordinary skill in the art would be motivated to combine Berens with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Berens with Kohno for many reasons. For example, Berens describes a method “an error free transmission of data packets.” Berens at 1:23-25. A person having ordinary skill in the art would have been motivated to modify the method of Berens to implement the details of a data communications system “to dynamically change the error processing between an ARQ function and an FEC function in accordance with the network status” taught by Kohno because, it is also directed at “error control.”

Kohno at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “dynamic error correction control” based on the characteristics present in the system. *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Berens with Kohno because (a) Berens and Kohno disclose similar products, such as data communications systems, data senders, data receivers, data communications methods, and computer programs; (b) Kohno is assigned to Sony Corporation, a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in data communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kohno’s teachings with those of Berens. For similar reasons, a person of ordinary skill in the art would be motivated to combine Berens with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Berens with Moon for many reasons. For example, Berens describes a method “an error free transmission of data packets.” Berens at 1:23-25. A person having ordinary skill in the art would have been motivated to modify the method of Berens to implement the details of “an apparatus for efficiently transmitting and receiving high-speed data” using channel interleavers taught by Moon because, it is also directed at error correction. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “higher reception probability.” Moon at 8:18-37. In addition, a person of ordinary skill in the art would be motivated to combine Berens with Moon because (a) Berens and Moon disclose similar products, such as improved data

transmission/reception systems; (b) Moon is assigned to Samsung Electronics Co., Ltd., a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to high-speed data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Moon's teachings with those of Berens. For similar reasons, a person of ordinary skill in the art would be motivated to combine Berens with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Berens with G.993.1 for many reasons. For example, Berens describes a method “an error free transmission of data packets.” Berens at 1:23-25. A person having ordinary skill in the art would have been motivated to modify the method of Berens to implement the details of “interleaving . . . used to protect the data against bursts of errors” taught by G.993.1 because, it is also directed at error correction. G.993.1 at 15. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “error correction ability.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Berens with G.993.1 because (a) Berens and G.993.1 disclose similar products, such as improvements in the operation of DSL transmission over wire pairs; (b) G.993.1 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.993.1's teachings with those of Berens. For similar reasons, a person of ordinary skill in the art would be

motivated to combine Berens with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Berens with HPAV for many reasons. For example, Berens describes a method “an error free transmission of data packets.” Berens at 1:23-25. A person having ordinary skill in the art would have been motivated to modify the method of Berens to implement the details of “high-quality, multi-stream entertainment oriented networking over existing AC wiring” taught by HPAV because, it is also directed at “highly efficient” and reliable data transmission. HPAV at 2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “best connectivity at the highest QoS” “at a cost that is competitive with other competing technologies.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Berens with HPAV because (a) Berens and HPAV disclose similar products, such as systems for efficient data transmission and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to data transmission and receiving. Moreover, a POSITA would have had a reasonable expectation of success in incorporating HPAV’s teachings with those of Berens. For similar reasons, a person of ordinary skill in the art would be motivated to combine Berens with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Berens with Yap for many reasons. For example, Berens describes a method “an error free transmission of data packets.” Berens at 1:23-25. A person having ordinary skill in the art would have been motivated

to modify the method of Berens to implement the details of “[a]n automatic retransmission control system” taught by Yap because, it is also directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “improv[ed] accuracy in the retransmission of signals and reducing the number of retransmission requests.” Yap at 2:18-27. In addition, a person of ordinary skill in the art would be motivated to combine Berens with Yap because (a) Berens and Yap disclose similar products, such as a system and method for data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yap’s teachings with those of Berens. For similar reasons, a person of ordinary skill in the art would be motivated to combine Berens with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Berens with Ysebaert for many reasons. For example, Berens describes a method “an error free transmission of data packets.” Berens at 1:23-25. A person having ordinary skill in the art would have been motivated to modify the method of Berens to implement the details of the “device and method for mitigating effects of impulse noise on data packet transfer” taught by Ysebaert because, it is also directed at error mitigation. Ysebaert at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “effects of impulse noise.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Berens with Ysebaert because (a) Berens and Ysebaert disclose similar products, such as devices and methods for data transmission; (b) Ysebaert was assigned to Alcatel Lucent., a leader to which a person of ordinary

skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ysebaert's teachings with those of Berens. For similar reasons, a person of ordinary skill in the art would be motivated to combine Berens with other references in Exhibits F9-577A-F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

(7) Exemplary ITU-T G.993.1 Solutions

A person of ordinary skill in the art would be motivated to combine G.993.1 with Chen for many reasons. For example, G.993.1 describes “interleaving . . . used to protect the data against bursts of errors.” G.993.1 at 15. A person having ordinary skill in the art would have been motivated to modify the method of Chen to implement the details of “interleaved FEC/ARQ error correction scheme” taught by Chen because, it is also directed at error correction. Chen at 159, col. 2, ¶ 2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for “error and loss control over the Internet.” Chen at 159, col. 1, ¶ 1. In addition, a person of ordinary skill in the art would be motivated to combine G.993.1 with Chen because (a) G.993.1 and Chen disclose similar products, such as methods to reduce error in data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods or systems for the improvement of data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Chen's teachings with those of G.993.1. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.993.1 with other references in Exhibits

F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.993.1 with Eriksson for many reasons. For example, G.993.1 describes “interleaving . . . used to protect the data against bursts of errors.” G.993.1 at 15. A person having ordinary skill in the art would have been motivated to modify the method of G.993.1 to implement the details of “control signalling for systems” taught by Eriksson because, it is also directed at “handl[ing] erroneously received information” in a data transmission system Eriksson at 2:26-27. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the ability to “aid a receiver to correct the erroneously received information, e.g., forward error correction (FEC) techniques, and those which enable the erroneously received information to be retransmitted to the receiver, e.g., automatic re-transmission (ARQ) techniques.” Eriksson at 2:19-24. In addition, a person of ordinary skill in the art would be motivated to combine G.993.1 with Eriksson because (a) G.993.1 and Eriksson disclose similar products, such as methods to reduce error in data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods or systems for the improvement of data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Eriksson’s teachings with those of G.993.1. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.993.1 with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.993.1 with G.992.3 for many reasons. For example, G.993.1 describes “interleaving . . . used to protect the data against

bursts of errors.” G.993.1 at 15. A person having ordinary skill in the art would have been motivated to modify the method of G.993.1 to implement the details of “data rate versus loop reach performance, loop diagnostics, deployment from remote cabinets, spectrum control, power control, robustness against loop impairments and RFI, and operations and maintenance” taught by G.992.3 because, it is also directed at improvements in transmission of data over DSL. G.992.3 at ii, Summary. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “error control.” G.992.3 at i, Summary. In addition, a person of ordinary skill in the art would be motivated to combine G.993.1 with G.992.3 because (a) G.993.1 and G.992.3 disclose similar products, such as improvements in the operation of data transmission; (b) G.992.3 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.992.3’s teachings with those of G.993.1. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.993.1 with other references in Exhibits F9-577A-F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.993.1 with Kohno for many reasons. For example, G.993.1 describes “interleaving . . . used to protect the data against bursts of errors.” G.993.1 at 15. A person having ordinary skill in the art would have been motivated to modify the method of G.993.1 to implement the details of a data communications system “to dynamically change the error processing between an ARQ function and an FEC function in accordance with the network status” taught by Kohno because, it is also directed at

“error control.” Kohno at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “dynamic error correction control” based on the characteristics present in the system. *Id.* In addition, a person of ordinary skill in the art would be motivated to combine G.993.1 with Kohno because (a) G.993.1 and Kohno disclose similar products, such as data communications systems, data senders, data receivers, data communications methods, and computer programs; (b) Kohno is assigned to Sony Corporation, a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in data communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kohno’s teachings with those of G.993.1. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.993.1 with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.993.1 with Moon for many reasons. For example, G.993.1 describes “interleaving . . . used to protect the data against bursts of errors.” G.993.1 at 15. A person having ordinary skill in the art would have been motivated to modify the method of G.993.1 to implement the details of “an apparatus for efficiently transmitting and receiving high-speed data” using channel interleavers taught by Moon because, it is also directed at error correction. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “higher reception probability.” Moon at 8:18-37. In addition, a person of ordinary skill in the art would be motivated to combine G.993.1 with Moon because (a) G.993.1 and Moon disclose similar products, such as improved data

transmission/reception systems; (b) Moon is assigned to Samsung Electronics Co., Ltd., a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to high-speed data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Moon's teachings with those of G.993.1. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.993.1 with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.993.1 with Berens for many reasons. For example, G.993.1 describes “interleaving . . . used to protect the data against bursts of errors.” G.993.1 at 15. A person having ordinary skill in the art would have been motivated to modify the method of G.993.1 to implement the details of the “ARQ scheme” taught by Berens because, it is also directed at “an error free transmission of data packets.” Berens at 1:23-25. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the simplified and improved implementation. Berens at 1:66-2:3. In addition, a person of ordinary skill in the art would be motivated to combine G.993.1 with Berens because (a) G.993.1 and Berens disclose similar products, such as improved wireless communication systems and wireline systems; (b) Berens is assigned to STMicroelectronics, a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to systems of data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Berens's teachings with those of G.993.1. For

similar reasons, a person of ordinary skill in the art would be motivated to combine G.993.1 with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.993.1 with HPAV for many reasons. For example, G.993.1 describes “interleaving . . . used to protect the data against bursts of errors.” G.993.1 at 15. A person having ordinary skill in the art would have been motivated to modify the method of G.993.1 to implement the details of “high-quality, multi-stream entertainment oriented networking over existing AC wiring” taught by HPAV because, it is also directed at “highly efficient” and reliable data transmission. HPAV at 2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “best connectivity at the highest QoS” “at a cost that is competitive with other competing technologies.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine G.993.1 with HPAV because (a) G.993.1 and HPAV disclose similar products, such as systems for efficient data transmission and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to data transmission and receiving. Moreover, a POSITA would have had a reasonable expectation of success in incorporating HPAV’s teachings with those of G.993.1. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.993.1 with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.993.1 with Yap for many reasons. For example, G.993.1 describes “interleaving . . . used to protect the data against

bursts of errors.” G.993.1 at 15. A person having ordinary skill in the art would have been motivated to modify the method of G.993.1 to implement the details of “[a]n automatic retransmission control system” taught by Yap because, it is also directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “improv[ed] accuracy in the retransmission of signals and reducing the number of retransmission requests.” Yap at 2:18-27. In addition, a person of ordinary skill in the art would be motivated to combine G.993.1 with Yap because (a) G.993.1 and Yap disclose similar products, such as a system and method for data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yap’s teachings with those of G.993.1. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.993.1 with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.993.1 with Ysebaert for many reasons. For example, G.993.1 describes “interleaving . . . used to protect the data against bursts of errors.” G.993.1 at 15. A person having ordinary skill in the art would have been motivated to modify the method of G.993.1 to implement the details of the “device and method for mitigating effects of impulse noise on data packet transfer” taught by Ysebaert because, it is also directed at error mitigation. Ysebaert at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “effects of impulse noise.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine G.993.1 with Ysebaert because (a) G.993.1 and Ysebaert disclose similar products, such as devices and

methods for data transmission; (b) Ysebaert was assigned to Alcatel Lucent., a leader to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ysebaert's teachings with those of G.993.1. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.993.1 with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

(8) Exemplary HPAV Solutions

A person of ordinary skill in the art would be motivated to combine HPAV with Chen for many reasons. For example, HPAV describes “high-quality, multi-stream entertainment oriented networking over existing AC wiring” directed at “highly efficient” and reliable data transmission. HPAV at 2. A person having ordinary skill in the art would have been motivated to modify the method of Chen to implement the details of “interleaved FEC/ARQ error correction scheme” taught by Chen because, it is also directed at error correction. Chen at 159, col. 2, ¶ 2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for “error and loss control over the Internet.” Chen at 159, col. 1, ¶ 1. In addition, a person of ordinary skill in the art would be motivated to combine HPAV with Chen because (a) HPAV and Chen disclose similar products, such as methods to reduce error in data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods or systems for the improvement of data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Chen's teachings

with those of HPAV. For similar reasons, a person of ordinary skill in the art would be motivated to combine HPAV with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine HPAV with Eriksson for many reasons. For example, HPAV describes “high-quality, multi-stream entertainment oriented networking over existing AC wiring” directed at “highly efficient” and reliable data transmission. HPAV at 2. A person having ordinary skill in the art would have been motivated to modify the method of HPAV to implement the details of “control signalling for systems” taught by Eriksson because, it is also directed at “handl[ing] erroneously received information” in a data transmission system Eriksson at 2:26-27. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the ability to “aid a receiver to correct the erroneously received information, e.g., forward error correction (FEC) techniques, and those which enable the erroneously received information to be retransmitted to the receiver, e.g., automatic re-transmission (ARQ) techniques.” Eriksson at 2:19-24. In addition, a person of ordinary skill in the art would be motivated to combine HPAV with Eriksson because (a) HPAV and Eriksson disclose similar products, such as methods to reduce error in data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods or systems for the improvement of data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Eriksson’s teachings with those of HPAV. For similar reasons, a person of ordinary skill in the art would be motivated to combine HPAV with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-

348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine HPAV with G.992.3 for many reasons. For example, HPAV describes “high-quality, multi-stream entertainment oriented networking over existing AC wiring” directed at “highly efficient” and reliable data transmission. HPAV at 2. A person having ordinary skill in the art would have been motivated to modify the method of HPAV to implement the details of “data rate versus loop reach performance, loop diagnostics, deployment from remote cabinets, spectrum control, power control, robustness against loop impairments and RFI, and operations and maintenance” taught by G.992.3 because, it is also directed at improvements in transmission of data over DSL. G.992.3 at ii, Summary. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “error control.” G.992.3 at i, Summary. In addition, a person of ordinary skill in the art would be motivated to combine HPAV with G.992.3 because (a) HPAV and G.992.3 disclose similar products, such as improvements in the operation of data transmission; (b) G.992.3 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.992.3’s teachings with those of HPAV. For similar reasons, a person of ordinary skill in the art would be motivated to combine HPAV with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine HPAV with Kohno for many reasons. For example, HPAV describes “high-quality, multi-stream entertainment oriented networking over existing AC wiring” directed at “highly efficient” and reliable data transmission. HPAV at 2. A person having ordinary skill in the art would have been motivated to modify the method of HPAV to implement the details of a data communications system “to dynamically change the error processing between an ARQ function and an FEC function in accordance with the network status” taught by Kohno because, it is also directed at “error control.” Kohno at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “dynamic error correction control” based on the characteristics present in the system. *Id.* In addition, a person of ordinary skill in the art would be motivated to combine HPAV with Kohno because (a) HPAV and Kohno disclose similar products, such as data communications systems, data senders, data receivers, data communications methods, and computer programs; (b) Kohno is assigned to Sony Corporation, a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in data communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kohno’s teachings with those of HPAV. For similar reasons, a person of ordinary skill in the art would be motivated to combine HPAV with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F9-809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine HPAV with Moon for many reasons. For example, HPAV describes “high-quality, multi-stream entertainment oriented

networking over existing AC wiring” directed at “highly efficient” and reliable data transmission. HPAV at 2. A person having ordinary skill in the art would have been motivated to modify the method of HPAV to implement the details of “an apparatus for efficiently transmitting and receiving high-speed data” using channel interleavers taught by Moon because, it is also directed at error correction. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “higher reception probability.” Moon at 8:18-37. In addition, a person of ordinary skill in the art would be motivated to combine HPAV with Moon because (a) HPAV and Moon disclose similar products, such as improved data transmission/reception systems; (b) Moon is assigned to Samsung Electronics Co., Ltd., a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to high-speed data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Moon’s teachings with those of HPAV. For similar reasons, a person of ordinary skill in the art would be motivated to combine HPAV with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine HPAV with Berens for many reasons. For example, HPAV describes “high-quality, multi-stream entertainment oriented networking over existing AC wiring” directed at “highly efficient” and reliable data transmission. HPAV at 2. A person having ordinary skill in the art would have been motivated to modify the method of HPAV to implement the details of the “ARQ scheme” taught by Berens because, it is also directed at “an error free transmission of data packets.” Berens at 1:23-25. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such

as the simplified and improved implementation. Berens at 1:66-2:3. In addition, a person of ordinary skill in the art would be motivated to combine HPAV with Berens because (a) HPAV and Berens disclose similar products, such as improved wireless communication systems and wireline systems; (b) Berens is assigned to STMicroelectronics, a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to systems of data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Berens's teachings with those of HPAV. For similar reasons, a person of ordinary skill in the art would be motivated to combine HPAV with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine HPAV with G.993.1 for many reasons. For example, HPAV describes “high-quality, multi-stream entertainment oriented networking over existing AC wiring” directed at “highly efficient” and reliable data transmission. HPAV at 2. A person having ordinary skill in the art would have been motivated to modify the method of HPAV to implement the details of “interleaving . . . used to protect the data against bursts of errors” taught by G.993.1 because, it is also directed at error correction. G.993.1 at 15. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “error correction ability.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine HPAV with G.993.1 because (a) HPAV and G.993.1 disclose similar products, such as improvements in the operation of DSL transmission over wire pairs; (b) G.993.1 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the

same field of endeavor as each other, for example, both relate to improvements in DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.993.1's teachings with those of HPAV. For similar reasons, a person of ordinary skill in the art would be motivated to combine HPAV with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine HPAV with Yap for many reasons. For example, HPAV describes “high-quality, multi-stream entertainment oriented networking over existing AC wiring” directed at “highly efficient” and reliable data transmission. HPAV at 2. A person having ordinary skill in the art would have been motivated to modify the method of HPAV to implement the details of “[a]n automatic retransmission control system” taught by Yap because, it is also directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “improv[ed] accuracy in the retransmission of signals and reducing the number of retransmission requests.” Yap at 2:18-27. In addition, a person of ordinary skill in the art would be motivated to combine HPAV with Yap because (a) HPAV and Yap disclose similar products, such as a system and method for data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yap's teachings with those of HPAV. For similar reasons, a person of ordinary skill in the art would be motivated to combine HPAV with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine HPAV with Ysebaert for many reasons. For example, HPAV describes “high-quality, multi-stream entertainment oriented networking over existing AC wiring” directed at “highly efficient” and reliable data transmission. HPAV at 2. A person having ordinary skill in the art would have been motivated to modify the method of HPAV to implement the details of the “device and method for mitigating effects of impulse noise on data packet transfer” taught by Ysebaert because, it is also directed at error mitigation. Ysebaert at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “effects of impulse noise.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine HPAV with Ysebaert because (a) HPAV and Ysebaert disclose similar products, such as devices and methods for data transmission, (b) Ysebaert was assigned to Alcatel Lucent., a leader to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ysebaert’s teachings with those of HPAV. For similar reasons, a person of ordinary skill in the art would be motivated to combine HPAV with other references in Exhibits F9-577A-F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

(9) Exemplary Yap Solutions

A person of ordinary skill in the art would be motivated to combine Yap with Chen for many reasons. For example, Yap describes “[a]n automatic retransmission control system” directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person having ordinary skill in the art would have been motivated to modify the method of Chen to implement the details

of “interleaved FEC/ARQ error correction scheme” taught by Chen because, it is also directed at error correction. Chen at 159, col. 2, ¶ 2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for “error and loss control over the Internet.” Chen at 159, col. 1, ¶ 1. In addition, a person of ordinary skill in the art would be motivated to combine Yap with Chen because (a) Yap and Chen disclose similar products, such as methods to reduce error in data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods or systems for the improvement of data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Chen’s teachings with those of Yap. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yap with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yap with Eriksson for many reasons. For example, Yap describes “[a]n automatic retransmission control system” directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person having ordinary skill in the art would have been motivated to modify the method of Yap to implement the details of “control signalling for systems” taught by Eriksson because, it is also directed at “handl[ing] erroneously received information” in a data transmission system Eriksson at 2:26-27. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the ability to “aid a receiver to correct the erroneously received information, e.g., forward error correction (FEC) techniques, and those which enable the erroneously received information to be retransmitted to the receiver, e.g., automatic re-transmission (ARQ) techniques.” Eriksson at 2:19-24. In addition, a person of ordinary skill in the art would be motivated to combine Yap with

Eriksson because (a) Yap and Eriksson disclose similar products, such as methods to reduce error in data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods or systems for the improvement of data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Eriksson's teachings with those of Yap. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yap with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yap with G.992.3 for many reasons. For example, Yap describes “[a]n automatic retransmission control system” directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person having ordinary skill in the art would have been motivated to modify the method of Yap to implement the details of “data rate versus loop reach performance, loop diagnostics, deployment from remote cabinets, spectrum control, power control, robustness against loop impairments and RFI, and operations and maintenance” taught by G.992.3 because, it is also directed at improvements in transmission of data over DSL. G.992.3 at ii, Summary. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “error control.” G.992.3 at i, Summary. In addition, a person of ordinary skill in the art would be motivated to combine Yap with G.992.3 because (a) Yap and G.992.3 disclose similar products, such as improvements in the operation of data transmission; (b) G.992.3 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in data transmission. Moreover, a POSITA would have had a reasonable

expectation of success in incorporating G.992.3's teachings with those of Yap. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yap with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yap with Kohno for many reasons. For example, Yap describes “[a]n automatic retransmission control system” directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person having ordinary skill in the art would have been motivated to modify the method of Yap to implement the details of a data communications system “to dynamically change the error processing between an ARQ function and an FEC function in accordance with the network status” taught by Kohno because, it is also directed at “error control.” Kohno at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “dynamic error correction control” based on the characteristics present in the system. *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Yap with Kohno because (a) Yap and Kohno disclose similar products, such as data communications systems, data senders, data receivers, data communications methods, and computer programs; (b) Kohno is assigned to Sony Corporation, a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in data communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kohno's teachings with those of Yap. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yap with other references in Exhibits F9-577A- F9-577J, F9-348A

– F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yap with Moon for many reasons. For example, Yap describes “[a]n automatic retransmission control system” directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person having ordinary skill in the art would have been motivated to modify the method of Yap to implement the details of “an apparatus for efficiently transmitting and receiving high-speed data” using channel interleavers taught by Moon because, it is also directed at error correction. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “higher reception probability.” Moon at 8:18-37. In addition, a person of ordinary skill in the art would be motivated to combine Yap with Moon because (a) Yap and Moon disclose similar products, such as improved data transmission/reception systems; (b) Moon is assigned to Samsung Electronics Co., Ltd., a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to high-speed data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Moon’s teachings with those of Yap. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yap with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yap with Berens for many reasons. For example, Yap describes “[a]n automatic retransmission control system” directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person having ordinary

skill in the art would have been motivated to modify the method of Yap to implement the details of the “ARQ scheme” taught by Berens because, it is also directed at “an error free transmission of data packets.” Berens at 1:23-25. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the simplified and improved implementation. Berens at 1:66-2:3. In addition, a person of ordinary skill in the art would be motivated to combine Yap with Berens because (a) Yap and Berens disclose similar products, such as improved wireless communication systems and wireline systems; (b) Berens is assigned to STMicroelectronics, a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to systems of data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Berens’s teachings with those of Yap. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yap with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yap with G.993.1 for many reasons. For example, Yap describes “[a]n automatic retransmission control system” directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person having ordinary skill in the art would have been motivated to modify the method of Yap to implement the details of “interleaving . . . used to protect the data against bursts of errors” taught by G.993.1 because, it is also directed at error correction. G.993.1 at 15. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “error correction ability.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Yap with G.993.1

because (a) Yap and G.993.1 disclose similar products, such as improvements in the operation of DSL transmission over wire pairs; (b) G.993.1 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.993.1's teachings with those of Yap. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yap with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yap with HPAV for many reasons. For example, Yap describes “[a]n automatic retransmission control system” directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person having ordinary skill in the art would have been motivated to modify the method of Yap to implement the details of “high-quality, multi-stream entertainment oriented networking over existing AC wiring” taught by HPAV because, it is also directed at “highly efficient” and reliable data transmission. HPAV at 2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “best connectivity at the highest QoS” “at a cost that is competitive with other competing technologies.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Yap with HPAV because (a) Yap and HPAV disclose similar products, such as systems for efficient data transmission and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to data transmission and receiving. Moreover, a POSITA would have had a reasonable expectation of success in incorporating HPAV's teachings with those of Yap. For similar reasons, a person of ordinary skill in the art would be motivated to

combine Yap with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yap with Ysebaert for many reasons. For example, Yap describes “[a]n automatic retransmission control system” directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person having ordinary skill in the art would have been motivated to modify the method of Yap to implement the details of the “device and method for mitigating effects of impulse noise on data packet transfer” taught by Ysebaert because, it is also directed at error mitigation. Ysebaert at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the reduced “effects of impulse noise.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Yap with Ysebaert because (a) Yap and Ysebaert disclose similar products, such as devices and methods for data transmission, (b) Ysebaert was assigned to Alcatel Lucent., a leader to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ysebaert’s teachings with those of Yap. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yap with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

(10) Exemplary Ysebaert Solutions

A person of ordinary skill in the art would be motivated to combine Ysebaert with Chen for many reasons. For example, Ysebaert describes “device and method for mitigating effects of impulse noise on data packet transfer” directed at error mitigation. Ysebaert at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Chen to implement the details of “interleaved FEC/ARQ error correction scheme” taught by Chen because, it is also directed at error correction. Chen at 159, col. 2, ¶ 2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for “error and loss control over the Internet.” Chen at 159, col. 1, ¶ 1. In addition, a person of ordinary skill in the art would be motivated to combine Ysebaert with Chen because (a) Ysebaert and Chen disclose similar products, such as methods to reduce error in data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods or systems for the improvement of data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Chen’s teachings with those of Ysebaert. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ysebaert with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ysebaert with Eriksson for many reasons. For example, Ysebaert describes “device and method for mitigating effects of impulse noise on data packet transfer” directed at error mitigation. Ysebaert at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Ysebaert to implement the details of “control signalling for systems” taught by Eriksson because, it is also

directed at “handl[ing] erroneously received information” in a data transmission system Eriksson at 2:26-27. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the ability to “aid a receiver to correct the erroneously received information, e.g., forward error correction (FEC) techniques, and those which enable the erroneously received information to be retransmitted to the receiver, e.g., automatic re-transmission (ARQ) techniques.” Eriksson at 2:19-24. In addition, a person of ordinary skill in the art would be motivated to combine Ysebaert with Eriksson because (a) Ysebaert and Eriksson disclose similar products, such as methods to reduce error in data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to methods or systems for the improvement of data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Eriksson’s teachings with those of Ysebaert. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ysebaert with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ysebaert with G.992.3 for many reasons. For example, Ysebaert describes “device and method for mitigating effects of impulse noise on data packet transfer” directed at error mitigation. Ysebaert at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Ysebaert to implement the details of “data rate versus loop reach performance, loop diagnostics, deployment from remote cabinets, spectrum control, power control, robustness against loop impairments and RFI, and operations and maintenance” taught by G.992.3 because, it is also directed at improvements in transmission of data over DSL. G.992.3 at ii, Summary. A person of ordinary

skill in the art would be motivated by the advantages of such functionality, such as the “error control.” G.992.3 at i, Summary. In addition, a person of ordinary skill in the art would be motivated to combine Ysebaert with G.992.3 because (a) Ysebaert and G.992.3 disclose similar products, such as improvements in the operation of data transmission; (b) G.992.3 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.992.3’s teachings with those of Ysebaert. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ysebaert with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ysebaert with Kohno for many reasons. For example, Ysebaert describes “device and method for mitigating effects of impulse noise on data packet transfer” directed at error mitigation. Ysebaert at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Ysebaert to implement the details of a data communications system “to dynamically change the error processing between an ARQ function and an FEC function in accordance with the network status” taught by Kohno because, it is also directed at “error control.” Kohno at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “dynamic error correction control” based on the characteristics present in the system. *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Ysebaert with Kohno because (a) Ysebaert and Kohno disclose similar products, such as data communications systems,

data senders, data receivers, data communications methods, and computer programs; (b) Kohno is assigned to Sony Corporation, a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in data communications systems. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kohno's teachings with those of Ysebaert. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ysebaert with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ysebaert with Moon for many reasons. For example, Ysebaert describes “device and method for mitigating effects of impulse noise on data packet transfer” directed at error mitigation. Ysebaert at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Ysebaert to implement the details of “an apparatus for efficiently transmitting and receiving high-speed data” using channel interleavers taught by Moon because, it is also directed at error correction. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “higher reception probability.” Moon at 8:18-37. In addition, a person of ordinary skill in the art would be motivated to combine Ysebaert with Moon because (a) Ysebaert and Moon disclose similar products, such as improved data transmission/reception systems; (b) Moon is assigned to Samsung Electronics Co., Ltd., a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to high-speed data transmission. Moreover, a POSITA would have had a reasonable expectation of success in

incorporating Moon's teachings with those of Ysebaert. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ysebaert with other references in Exhibits F9-577A-F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ysebaert with Berens for many reasons. For example, Ysebaert describes “device and method for mitigating effects of impulse noise on data packet transfer” directed at error mitigation. Ysebaert at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Ysebaert to implement the details of the “ARQ scheme” taught by Berens because, it is also directed at “an error free transmission of data packets.” Berens at 1:23-25. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the simplified and improved implementation. Berens at 1:66-2:3. In addition, a person of ordinary skill in the art would be motivated to combine Ysebaert with Berens because (a) Ysebaert and Berens disclose similar products, such as improved wireless communication systems and wireline systems; (b) Berens is assigned to STMicroelectronics, a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to systems of data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Berens's teachings with those of Ysebaert. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ysebaert with other references in Exhibits F9-577A-F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ysebaert with G.993.1 for many reasons. For example, Ysebaert describes “device and method for mitigating effects of impulse noise on data packet transfer” directed at error mitigation. Ysebaert at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Ysebaert to implement the details of “interleaving . . . used to protect the data against bursts of errors” taught by G.993.1 because, it is also directed at error correction. G.993.1 at 15. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “error correction ability.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Ysebaert with G.993.1 because (a) Ysebaert and G.993.1 disclose similar products, such as improvements in the operation of DSL transmission over wire pairs; (b) G.993.1 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.993.1’s teachings with those of Ysebaert. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ysebaert with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ysebaert with HPAV for many reasons. For example, Ysebaert describes “device and method for mitigating effects of impulse noise on data packet transfer” directed at error mitigation. Ysebaert at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Ysebaert to implement the details of “high-quality, multi-stream entertainment oriented networking over

existing AC wiring” taught by HPAV because, it is also directed at “highly efficient” and reliable data transmission. HPAV at 2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “best connectivity at the highest QoS” “at a cost that is competitive with other competing technologies.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Ysebaert with HPAV because (a) Ysebaert and HPAV disclose similar products, such as systems for efficient data transmission and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to data transmission and receiving. Moreover, a POSITA would have had a reasonable expectation of success in incorporating HPAV’s teachings with those of Ysebaert. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ysebaert with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ysebaert with Yap for many reasons. For example, Ysebaert describes “device and method for mitigating effects of impulse noise on data packet transfer” directed at error mitigation. Ysebaert at Abstract. A person having ordinary skill in the art would have been motivated to modify the method of Ysebaert to implement the details of “[a]n automatic retransmission control system” taught by Yap because, it is also directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “improv[ed] accuracy in the retransmission of signals and reducing the number of retransmission requests.” Yap at 2:18-27. In addition, a person of ordinary skill in the art would be motivated to combine Ysebaert with Yap because (a) Ysebaert and Yap disclose similar products, such as a system and method for data transmission and (b) both patents are analogous art and in the same

field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yap's teachings with those of Ysebaert. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ysebaert with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

(11) Exemplary Obviousness Reference Solutions

A person of ordinary skill in the art would be motivated to combine Chen, Eriksson, G.992.3, Kohno, Moon, Berens, G.993.1, HPAV, Yap, and Ysebaert (the "Primary References") with the Secondary References for many reasons. As described above, each of the primary references all teach methods or devices that increase DSL capacity or transmission rate to improve upon existing DSL technology. *See* Sections VII.B.3.c)(1)-(10). A person having ordinary skill in the art would have been motivated to modify the method of the Primary References to implement the details of the Secondary References because they are also directed at methods to reduce error in DSL. For example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of "interleaving and combining multiple DMT symbols in a single RS codeword." *See, e.g.,* Nedev at Abstract. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of "radio link protocol for a communications system" to "ensure that delivery of Internet protocol packets occur with a set delay bound for the packets, in order to satisfy specified quality of service levels." Earnshaw at Abstract. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "Incremental Redundancy (IR) operations in a wireless receiver." Chang at Abstract. In addition, a person of ordinary skill in the art would be

motivated to combine any Primary Reference with and Secondary reference because (a) each reference discloses similar products, such as methods used in providing DSL to subscribers with reduced error and (b) the references are analogous art and in the same field of endeavor as each other, for example, both relate to DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the Secondary References' teachings with those of the Primary References. For similar reasons, a person of ordinary skill in the art would be motivated to combine the Primary References with other references in Exhibits F9-577A- F9-577J, F9-348A – F9-348J, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-577, F9 Secondary-348, F9 Secondary-4473, F9 Secondary-809 with similar teachings.

d) Prior Art Solutions for the '411 Patent

In addition to the exemplary combinations provided above, to the extent TQ Delta alleges the references in Exhibits F9-411A – F9-411E and F9 Secondary-411 do not disclose any particular limitation of the Asserted Claims of the Family 9 Patents, either expressly or inherently, it would have been obvious to a person of ordinary skill in the art as of the alleged invention date of the Family 9 Patents to modify the references in Exhibits F9-411A – F9-411E and F9 Secondary-411 and/or combine the teachings of the references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with the other prior art references in Exhibits F9-411A – F9-411E and F9 Secondary-411 in a manner that would have rendered the Asserted Claims invalid as obvious. Nokia Defendants provide examples of such combinations below. The exemplary combinations below are non-exhaustive, and Nokia Defendants reserve the right to rely on additional combinations as may be apparent from the prior art references in Exhibits F9-411A – F9-411E and F9 Secondary-411. These obviousness combinations should not be construed to suggest that any reference included in any combination is not anticipatory in its own right.

(1) Exemplary G.993.1 Solutions

A person of ordinary skill in the art would have been motivated to combine G.993.1 with Berens for many reasons. For example, G.993.1 describes “interleaving . . . used to protect the data against bursts of errors.” G.993.1 at 15. A person having ordinary skill in the art would have been motivated to modify the method of G.993.1 to implement the details of the “ARQ scheme” taught by Berens because, it is also directed at “an error free transmission of data packets.” Berens at 1:23-25. A person of ordinary skill in the art would have been motivated by the advantages of such functionality, such as the simplified and improved implementation. Berens at 1:66-2:3. In addition, a person of ordinary skill in the art would be motivated to combine G.993.1 with Berens because (a) G.993.1 and Berens disclose similar products, such as improved wireless communication systems and wireline systems, (b) Berens is assigned to STMicroelectronics, a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to systems of data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Berens’s teachings with those of G.993.1. For similar reasons, a person of ordinary skill in the art would have been motivated to combine G.993.1 with other references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine G.993.1 with Yap for many reasons. For example, G.993.1 describes “interleaving . . . used to protect the data against bursts of errors.” G.993.1 at 15. A person having ordinary skill in the art would have been motivated to modify the method of G.993.1 to implement the details of “[a]n automatic retransmission control system” taught by Yap because, it is also directed at reducing error in data

transmission. Yap at Abstract, 2:18-27. A person of ordinary skill in the art would have been motivated by the advantages of such functionality, such as the “improv[ed] accuracy in the retransmission of signals and reducing the number of retransmission requests.” Yap at 2:18-27. In addition, a person of ordinary skill in the art would have been motivated to combine G.993.1 with Yap because (a) G.993.1 and Yap disclose similar products, such as a system and method for data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yap’s teachings with those of G.993.1. For similar reasons, a person of ordinary skill in the art would have been motivated to combine G.993.1 with other references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine G.993.1 with Aramvith for many reasons. For example, G.993.1 describes “interleaving . . . used to protect the data against bursts of errors.” G.993.1 at 15. A person of ordinary skill in the art would have been motivated to modify the method of G.993.1 to implement the details of “the retransmission-based system” taught by Aramvith because it is also directed at reducing error in data transmission. Aramvith at 1. A person of ordinary skill in the art would have been motivated by the advantages of such functionality, such as “reduc[ing] the number of packet errors and improv[ing] the channel utilization.” Aramvith at Abstract. In addition, a person of ordinary skill in the art would have been motivated to combine G.993.1 with Aramvith because (a) G.993.1 and Aramvith disclose similar products, such as a system and method for data transmission and (b) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in

incorporating Aramvith's teachings with those of G.993.1. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.993.1 with other references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with similar teachings.

A person of ordinary skill in the art would have been motivated to combine G.993.1 with TS 25.401 and TR 25.896 for many reasons. For example, G.993.1 describes “interleaving . . . used to protect the data against bursts of errors.” G.993.1 at 15. A person of ordinary skill in the art would have been motivated to modify the method of G.993.1 to implement the details of the “Dedicated Transport Channels” and “UTRAN” taught by TS 25.401 and TR 25.896 because it is also directed at reducing error in data transmission. TS 25.401 at 6; TR 25.896 at 9. A person of ordinary skill in the art would have been motivated by the advantages of such functionality, such as “enhance[ing] uplink performance in general or [] enhance[ing] the uplink performance for background, interactive and streaming based traffic.” TR 25.896 at 9. In addition, a person of ordinary skill in the art would have been motivated to combine G.993.1 with TS 25.401 and TR 25.896 because (a) G.993.1 and TS 25.401 and TR 25.896 disclose similar technologies, such as a system and method for data transmission and (b) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating TS 25.401 and TR 25.896's teachings with those of G.993.1. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.993.1 with other references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with similar teachings.

(2) Exemplary Berens Solutions

A person of ordinary skill in the art would be motivated to combine Berens with G.993.1 for many reasons. For example, Berens describes a method “an error free transmission of data

packets.” Berens at 1:23-25. A person having ordinary skill in the art would have been motivated to modify the method of Berens to implement the details of “interleaving . . . used to protect the data against bursts of errors” taught by G.993.1 because, it is also directed at error correction. G.993.1 at 15. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “error correction ability.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Berens with G.993.1 because (a) Berens and G.993.1 disclose similar products, such as improvements in the operation of DSL transmission over wire pairs; (b) G.993.1 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.993.1’s teachings with those of Berens. For similar reasons, a person of ordinary skill in the art would be motivated to combine Berens with other references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Berens with Yap for many reasons. For example, Berens describes a method “an error free transmission of data packets.” Berens at 1:23-25. A person having ordinary skill in the art would have been motivated to modify the method of Berens to implement the details of “[a]n automatic retransmission control system” taught by Yap because, it is also directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “improv[ed] accuracy in the retransmission of signals and reducing the number of retransmission requests.” Yap at 2:18-27. In addition, a person of ordinary skill in the art would be motivated to combine Berens with Yap because (a) Berens and Yap disclose

similar products, such as a system and method for data transmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yap's teachings with those of Berens. For similar reasons, a person of ordinary skill in the art would be motivated to combine Berens with other references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Berens with Aramvith for many reasons. For example, Berens describes a method “an error free transmission of data packets.” Berens at 1:23-25. A person having ordinary skill in the art would have been motivated to modify the method of Berens to implement the details of “the retransmission-based system” taught by Aramvith because it is also directed at reducing error in data transmission. Aramvith at 1. A person of ordinary skill in the art would have been motivated by the advantages of such functionality, such as “reduc[ing] the number of packet errors and improv[ing] the channel utilization.” Aramvith at Abstract. In addition, a person of ordinary skill in the art would have been motivated to combine Berens with Aramvith because (a) Berens and Aramvith disclose similar products, such as a system and method for data transmission and (b) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Aramvith's teachings with those of Berens. For similar reasons, a person of ordinary skill in the art would be motivated to combine Berens with other references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Berens with TS 25.401 and TR 25.896 for many reasons. For example, Berens describes a method “an error free

transmission of data packets.” Berens at 1:23-25. A person having ordinary skill in the art would have been motivated to modify the method of Berens to implement the details of the “Dedicated Transport Channels” and “UTRAN” taught by TS 25.401 and TR 25.896 because it is also directed at reducing error in data transmission. TS 25.401 at 6; TR 25.896 at 9. A person of ordinary skill in the art would have been motivated by the advantages of such functionality, such as “enhance[ing] uplink performance in general or [] enhance[ing] the uplink performance for background, interactive and streaming based traffic.” TR 25.896 at 9. In addition, a person of ordinary skill in the art would have been motivated to combine Berens with TS 25.401 and TR 25.896 because (a) Berens and TS 25.401 and TR 25.896 disclose similar technologies, such as a system and method for data transmission and (b) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating TS 25.401 and TR 25.896’s teachings with those of Berens. For similar reasons, a person of ordinary skill in the art would be motivated to combine Berens with other references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with similar teachings.

(3) Exemplary Yap Solutions

A person of ordinary skill in the art would be motivated to combine Yap with Berens for many reasons. For example, Yap describes “[a]n automatic retransmission control system” directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person having ordinary skill in the art would have been motivated to modify the method of Yap to implement the details of the “ARQ scheme” taught by Berens because, it is also directed at “an error free transmission of data packets.” Berens at 1:23-25. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the simplified and improved implementation. Berens

at 1:66-2:3. In addition, a person of ordinary skill in the art would be motivated to combine Yap with Berens because (a) Yap and Berens disclose similar products, such as improved wireless communication systems and wireline systems; (b) Berens is assigned to STMicroelectronics, a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to systems of data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Berens's teachings with those of Yap. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yap with other references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yap with G.993.1 for many reasons. For example, Yap describes “[a]n automatic retransmission control system” directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person having ordinary skill in the art would have been motivated to modify the method of Yap to implement the details of “interleaving . . . used to protect the data against bursts of errors” taught by G.993.1 because, it is also directed at error correction. G.993.1 at 15. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “error correction ability.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Yap with G.993.1 because (a) Yap and G.993.1 disclose similar products, such as improvements in the operation of DSL transmission over wire pairs; (b) G.993.1 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in DSL. Moreover, a POSITA would have had a reasonable expectation of

success in incorporating G.993.1's teachings with those of Yap. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yap with other references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yap with Aramvith for many reasons. For example, Yap describes “[a]n automatic retransmission control system” directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person having ordinary skill in the art would have been motivated to modify the method of Yap to implement the details of “the retransmission-based system” taught by Aramvith because it is also directed at reducing error in data transmission. Aramvith at 1. A person of ordinary skill in the art would have been motivated by the advantages of such functionality, such as “reduc[ing] the number of packet errors and improv[ing] the channel utilization.” Aramvith at Abstract. In addition, a person of ordinary skill in the art would have been motivated to combine Yap with Aramvith because (a) Yap and Aramvith disclose similar products, such as a system and method for data transmission and (b) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Aramvith's teachings with those of Yap. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yap with other references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yap with TS 25.401 and TR 25.896 for many reasons. For example, Yap describes “[a]n automatic retransmission control system” directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person having ordinary skill in the art would have been motivated to modify the method of Yap to implement the details of the “Dedicated Transport Channels” and “UTRAN” taught by TS 25.401

and TR 25.896 because it is also directed at reducing error in data transmission. TS 25.401 at 6; TR 25.896 at 9. A person of ordinary skill in the art would have been motivated by the advantages of such functionality, such as “enhance[ing] uplink performance in general or [] enhance[ing] the uplink performance for background, interactive and streaming based traffic.” TR 25.896 at 9. In addition, a person of ordinary skill in the art would have been motivated to combine Yap with TS 25.401 and TR 25.896 because (a) Yap and TS 25.401 and TR 25.896 disclose similar technologies, such as a system and method for data transmission and (b) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating TS 25.401 and TR 25.896’s teachings with those of Yap. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yap with other references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with similar teachings.

(4) Exemplary Aramvith Solutions

A person of ordinary skill in the art would be motivated to combine Aramvith with Berens for many reasons. For example, Aramvith describes a “retransmission-based system” that reduce[s] the number of packet errors and improve[s] the channel utilization.” Aramvith at Abstract, 1. A person having ordinary skill in the art would have been motivated to modify the method of Aramvith to implement the details of the “ARQ scheme” taught by Berens because, it is also directed at “an error free transmission of data packets.” Berens at 1:23-25. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the simplified and improved implementation. Berens at 1:66-2:3. In addition, a person of ordinary skill in the art would be motivated to combine Aramvith with Berens because (a) Aramvith and Berens disclose similar products, such as improved wireless communication systems and wireline

systems; (b) Berens is assigned to STMicroelectronics, a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to systems of data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Berens's teachings with those of Aramvith. For similar reasons, a person of ordinary skill in the art would be motivated to combine Aramvith with other references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Aramvith with G.993.1 for many reasons. For example, Aramvith describes a “retransmission-based system” that reduce[s] the number of packet errors and improve[s] the channel utilization.” Aramvith at Abstract, 1. A person having ordinary skill in the art would have been motivated to modify the method of Aramvith to implement the details of “interleaving . . . used to protect the data against bursts of errors” taught by G.993.1 because, it is also directed at error correction. G.993.1 at 15. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “error correction ability.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine Aramvith with G.993.1 because (a) Aramvith and G.993.1 disclose similar products, such as improvements in the operation of DSL transmission over wire pairs; (b) G.993.1 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.993.1's teachings with those of Aramvith. For similar reasons, a person of ordinary skill in the art would be motivated

to combine Aramvith with other references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Aramvith with Yap for many reasons. For example, Aramvith describes a “retransmission-based system” that reduce[s] the number of packet errors and improve[s] the channel utilization.” Aramvith at Abstract, 1. A person having ordinary skill in the art would have been motivated to modify the method of Aramvith to implement the details of “[a]n automatic retransmission control system” taught by Yap because, it is also directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “improv[ed] accuracy in the retransmission of signals and reducing the number of retransmission requests.” Yap at 2:18-27. In addition, a person of ordinary skill in the art would be motivated to combine Aramvith with Yap because (a) Aramvith and Yap disclose similar products, such as a system and method for data transmission and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yap’s teachings with those of Aramvith. For similar reasons, a person of ordinary skill in the art would be motivated to combine Aramvith with other references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Aramvith with TS 25.401 and TR 25.896 for many reasons. For example, Aramvith describes a “retransmission-based system” that reduce[s] the number of packet errors and improve[s] the channel utilization.” Aramvith at Abstract, 1. A person having ordinary skill in the art would have been motivated to modify the method of Aramvith to implement the details of the “Dedicated Transport Channels”

and “UTRAN” taught by TS 25.401 and TR 25.896 because it is also directed at reducing error in data transmission. TS 25.401 at 6; TR 25.896 at 9. A person of ordinary skill in the art would have been motivated by the advantages of such functionality, such as “enhance[ing] uplink performance in general or [] enhance[ing] the uplink performance for background, interactive and streaming based traffic.” TR 25.896 at 9. In addition, a person of ordinary skill in the art would have been motivated to combine Aramvith with TS 25.401 and TR 25.896 because (a) Aramvith and TS 25.401 and TR 25.896 disclose similar technologies, such as a system and method for data transmission and (b) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating TS 25.401 and TR 25.896’s teachings with those of Aramvith. For similar reasons, a person of ordinary skill in the art would be motivated to combine Aramvith with other references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with similar teachings.

(5) Exemplary TS 25.401 and TR 25.896 Solutions

A person of ordinary skill in the art would be motivated to combine TS 25.401 and TR 25.896 with Berens for many reasons. For example, TS 25.401 and TR 25.896 describes methodologies of improving “Dedicated Transport Channels” and “UTRAN,” thus “enhance[ing] uplink performance in general or [] enhance[ing] the uplink performance for background, interactive and streaming based traffic.” TS 25.401 at 6; TR 25.896 at 9. A person having ordinary skill in the art would have been motivated to modify the method of TS 25.401 and TR 25.896 to implement the details of the “ARQ scheme” taught by Berens because, it is also directed at “an error free transmission of data packets.” Berens at 1:23-25. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the simplified and improved

implementation. Berens at 1:66-2:3. In addition, a person of ordinary skill in the art would be motivated to combine TS 25.401 and TR 25.896 with Berens because (a) TS 25.401 and TR 25.896 and Berens disclose similar products, such as improved wireless communication systems and wireline systems; (b) Berens is assigned to STMicroelectronics, a player in the industry to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to systems of data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Berens's teachings with those of TS 25.401 and TR 25.896. For similar reasons, a person of ordinary skill in the art would be motivated to combine TS 25.401 and TR 25.896 with other references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with similar teachings.

A person of ordinary skill in the art would be motivated to combine TS 25.401 and TR 25.896 with G.993.1 for many reasons. For example, TS 25.401 and TR 25.896 describes methodologies of improving “Dedicated Transport Channels” and “UTRAN,” thus “enhance[ing] uplink performance in general or [] enhance[ing] the uplink performance for background, interactive and streaming based traffic.” TS 25.401 at 6; TR 25.896 at 9. A person having ordinary skill in the art would have been motivated to modify the method of TS 25.401 and TR 25.896 to implement the details of “interleaving . . . used to protect the data against bursts of errors” taught by G.993.1 because, it is also directed at error correction. G.993.1 at 15. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “error correction ability.” *Id.* In addition, a person of ordinary skill in the art would be motivated to combine TS 25.401 and TR 25.896 with G.993.1 because (a) TS 25.401 and TR 25.896 and G.993.1 disclose similar products, such as improvements in the operation of DSL transmission over wire pairs; (b)

G.993.1 is the industry standard document to which a person of ordinary skill in the art may look when seeking to improve existing products, and (c) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in DSL. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.993.1's teachings with those of TS 25.401 and TR 25.896. For similar reasons, a person of ordinary skill in the art would be motivated to combine TS 25.401 and TR 25.896 with other references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with similar teachings.

A person of ordinary skill in the art would be motivated to combine TS 25.401 and TR 25.896 with Yap for many reasons. For example, TS 25.401 and TR 25.896 describes methodologies of improving “Dedicated Transport Channels” and “UTRAN,” thus “enhance[ing] uplink performance in general or [] enhance[ing] the uplink performance for background, interactive and streaming based traffic.” TS 25.401 at 6; TR 25.896 at 9. A person having ordinary skill in the art would have been motivated to modify the method of TS 25.401 and TR 25.896 to implement the details of “[a]n automatic retransmission control system” taught by Yap because, it is also directed at reducing error in data transmission. Yap at Abstract, 2:18-27. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the “improv[ed] accuracy in the retransmission of signals and reducing the number of retransmission requests.” Yap at 2:18-27. In addition, a person of ordinary skill in the art would be motivated to combine TS 25.401 and TR 25.896 with Yap because (a) TS 25.401 and TR 25.896 and Yap disclose similar products, such as a system and method for data transmission and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yap's teachings with those of TS 25.401 and TR 25.896.

For similar reasons, a person of ordinary skill in the art would be motivated to combine TS 25.401 and TR 25.896 with other references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with similar teachings.

A person of ordinary skill in the art would be motivated to combine TS 25.401 and TR 25.896 with Aramvith for many reasons. For example, TS 25.401 and TR 25.896 describes methodologies of improving “Dedicated Transport Channels” and “UTRAN,” thus “enhance[ing] uplink performance in general or [] enhance[ing] the uplink performance for background, interactive and streaming based traffic.” TS 25.401 at 6; TR 25.896 at 9. A person having ordinary skill in the art would have been motivated to modify the method of TS 25.401 and TR 25.896 to implement the details of “the retransmission-based system” taught by Aramvith because it is also directed at reducing error in data transmission. Aramvith at 1. A person of ordinary skill in the art would have been motivated by the advantages of such functionality, such as “reduc[ing] the number of packet errors and improv[ing] the channel utilization.” Aramvith at Abstract. In addition, a person of ordinary skill in the art would have been motivated to combine TS 25.401 and TR 25.896 with Aramvith because (a) TS 25.401 and TR 25.896 and Aramvith disclose similar products, such as a system and method for data transmission and (b) both disclosures are analogous art and in the same field of endeavor as each other, for example, both relate to improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Aramvith’s teachings with those of TS 25.401 and TR 25.896. For similar reasons, a person of ordinary skill in the art would be motivated to combine TS 25.401 and TR 25.896 with other references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with similar teachings.

(6) Exemplary Obviousness Reference Solutions

A person of ordinary skill in the art would be motivated to combine Berens, G.993.1, Yap, Aramvith, and TS 25.401 and TR 25.896 (the “Primary References”) with the Secondary References for many reasons. As described above, each of the primary references teach systems and methods for improving data transmission. See Sections VII.B.3.d)(1)-(5). A person having ordinary skill in the art would have been motivated to modify the method of the Primary References to implement the details of the Secondary References because they are also directed at improving data transmission. For example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of “[c]ontrol signaling for systems employing link adaptation and incremental redundancy,” including by using “ARQ techniques” that “involve[s] analyzing received blocks of data for errors and requesting retransmission of blocks which contain errors.” Eriksson at Abstract, 2:32–34. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of a “system for implementing Incremental Redundancy (IR) operations in a wireless receiver,” wherein the memory “includes retransmission information.” Chang at Abstract, 3:24–25. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of a “RLP (Radio Link Protocol) algorithm that operates a transmitter and a receiver of the network in a manner to provide on-time delivery of transmitted data,” which is concerned with “improving communications over a network.” Earnshaw at 3:10–24. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of “[c]onvolutional interleaving” to “spread the Reed-Solomon codeword and, therefore, reduce the probability of failure of the FEC in the presence of impulse noise.” G.992.3 at 30. As another example, a person of ordinary skill in the art would be

motivated by the advantages of such functionality, such as the use of “a technique for transmitting a packet such that the whole packet transmitted at a retransmission is equal to the packet transmitted at the initial transmission” by combining “the retransmitted packet with the initially transmitted packet that is previously stored in a buffer,” which makes it “possible to increase the reliability of coded bits input to a decoder, thus resulting in an increase in the overall system performance.” Moon at 2:30–51. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of varying retransmission mechanisms, including combining FEC mechanisms with interleaving at the physical layer. Ysebaert at [0004], [0012]. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of a method “for improving a cooperation between a packetized data bit-rate adaptation and a data packet re-transmission” through the use of a transmission buffer. Aksu at Abstract, [0027].

In addition, a person of ordinary skill in the art would be motivated to combine any Primary Reference with and Secondary reference because (a) each reference discloses similar technologies, such as systems and methods for data transmission and error correction and (b) the references are analogous art and in the same field of endeavor as each other, for example, both relate improved data transmission. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the Secondary References’ teachings with those of the Primary References. For similar reasons, a person of ordinary skill in the art would be motivated to combine the Primary References with other references in Exhibits F9-411A – F9-411E and F9 Secondary-411 with similar teachings.

e) Prior Art Solutions for the '055 Patent

In addition to the exemplary combinations provided above, to the extent TQ Delta alleges the references in Exhibits F9-055A – F9-055D and F9 Secondary-055 do not disclose any particular limitation of the Asserted Claims of the Family 9 Patents, either expressly or inherently, it would have been obvious to a person of ordinary skill in the art as of the alleged invention date of the Family 9 Patents to modify the references in Exhibits F9-055A – F9-055D and F9 Secondary-055 and/or combine the teachings of the references in Exhibits F9-055A – F9-055D and F9 Secondary-055 with the other prior art references in Exhibits F9-055A – F9-055D and F9 Secondary-055 in a manner that would have rendered the Asserted Claims invalid as obvious. Nokia Defendants provide examples of such combinations below. The exemplary combinations below are non-exhaustive, and Nokia Defendants reserve the right to rely on additional combinations as may be apparent from the prior art references in Exhibits F9-055A – F9-055D and F9 Secondary-055. These obviousness combinations should not be construed to suggest that any reference included in any combination is not anticipatory in its own right.

(1) Exemplary TS 125 322 Solutions

A person of ordinary skill in the art would be motivated to combine TS 125 322 with Kawakami for many reasons. For example, TS 125 322 describes a communication technology including a protocol including retransmission. *E.g.*, TS 125 322 at § 1, 4.2.1.3. A person having ordinary skill in the art would have been motivated to modify TS 125 322 to implement the details of improved quality and performance of mobile equipment in reducing the establishment of radio protocol connections taught by Kawakami because, it is also directed at to communication technologies involving transmission and retransmission of packets. *E.g.*, Kawakami at Abstract, [0003], [0006]. In addition, a person of ordinary skill in the art would be motivated to combine TS

125 322 with Kawakami because (a) TS 125 322 and Kawakami disclose similar systems, apparatus, and method related to packet retransmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to systems, apparatuses, or methods for the improvement of quality of service for data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Kawakami with those of TS 125 322. For similar reasons, a person of ordinary skill in the art would be motivated to combine TS 125 322 with other references in Exhibits F9-055A – F9-055D and F9 Secondary-055 with similar teachings.

A person of ordinary skill in the art would be motivated to combine TS 125 322 with Petranovich for many reasons. For example, TS 125 322 describes a communication technology including a protocol including retransmission. *E.g.*, TS 125 322 at § 1, 4.2.1.3. A person having ordinary skill in the art would have been motivated to modify TS 125 322 to implement details of the MAC layer protocol taught by Petranovich because, it is also directed at to communication technologies involving transmission and retransmission of packets. *E.g.*, Petranovich at 2:66-3:22. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for addressing frequency variations and error during transmission. *E.g.*, Petranovich at 2:23-62. In addition, a person of ordinary skill in the art would be motivated to combine TS 125 322 with Petranovich because (a) TS 125 322 and Petranovich disclose similar systems, apparatus, and method related to packet retransmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to systems, apparatuses, or methods for the improvement of quality of service for data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Petranovich with those of TS 125 322. For similar reasons, a person of ordinary skill in the art

would be motivated to combine TS 125 322 with other references in Exhibits F9-055A – F9-055D and F9 Secondary-055 with similar teachings.

A person of ordinary skill in the art would be motivated to combine TS 125 322 with Yi for many reasons. For example, TS 125 322 describes a communication technology including a protocol including retransmission. *E.g.*, TS 125 322 at § 1, 4.2.1.3. A person having ordinary skill in the art would have been motivated to modify TS 125 322 to implement the details of generating protocol data units in a split mode taught by Yi because, it is also directed at to communication technologies involving transmission and retransmission of packets. *E.g.*, Yi at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as using a split mode to transport portions of a data unit corresponding to a lower error rate separately on a different channel. *See. e.g.*, Yi at [0007], [0009]. In addition, a person of ordinary skill in the art would be motivated to combine TS 125 322 with Yi because (a) TS 125 322 and Yi disclose similar systems, apparatus, and method related to packet retransmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to systems, apparatuses, or methods for the improvement of quality of service for data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Yi with those of TS 125 322. For similar reasons, a person of ordinary skill in the art would be motivated to combine TS 125 322 with other references in Exhibits F9-055A – F9-055D and F9 Secondary-055 with similar teachings.

(2) Exemplary Kawakami Solutions

A person of ordinary skill in the art would be motivated to combine Kawakami with TS 125 322 for many reasons. For example, Kawakami describes a communication technology including retransmission, including basing retransmission on a QoS reference. *E.g.*, Kawakami at

Abstract, [0006]. A person having ordinary skill in the art would have been motivated to modify Kawakami to implement the details TS 125 322, including the model and protocol for retransmission taught by TS 125 322 because, it is also directed at to communication technologies involving transmission and retransmission of packets. *E.g.*, TS 125 322 at §§ 1, 4.2.1.3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the multiple modes for transmission and detailed explanation of implementation. *E.g.*, TS 125 322 at §§ 1, 4.2, 6.1. In addition, a person of ordinary skill in the art would be motivated to combine Kawakami with TS 125 322 because (a) Kawakami and TS 125 322 disclose similar systems, apparatus, and method related to packet retransmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to systems, apparatuses, or methods for the improvement of quality of service for data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of TS 125 322 with those of Kawakami. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kawakami with other references in Exhibits F9-055A – F9-055D and F9 Secondary-055 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kawakami with Petranovich for many reasons. For example, Kawakami describes a communication technology including retransmission, including basing retransmission on a QoS reference. *E.g.*, Kawakami at Abstract, [0006]. A person having ordinary skill in the art would have been motivated to modify Kawakami to implement details of the MAC layer protocol taught by Petranovich because, it is also directed at to communication technologies involving transmission and retransmission of packets. *E.g.*, Petranovich at 2:66-3:22. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for addressing frequency variations

and error during transmission. *E.g.*, Petranovich at 2:23-62. In addition, a person of ordinary skill in the art would be motivated to combine Kawakami with Petranovich because (a) Kawakami and Petranovich disclose similar systems, apparatus, and method related to packet retransmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to systems, apparatuses, or methods for the improvement of quality of service for data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Petranovich with those of Kawakami. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kawakami with other references in Exhibits F9-055A – F9-055D and F9 Secondary-055 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kawakami with Yi for many reasons. For example, Kawakami describes a communication technology including retransmission, including basing retransmission on a QoS reference. *E.g.*, Kawakami at Abstract, [0006]. A person having ordinary skill in the art would have been motivated to modify Kawakami to implement the details of generating protocol data units in a split mode taught by Yi because, it is also directed at to communication technologies involving transmission and retransmission of packets. *E.g.*, Yi at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as using a split mode to transport portions of a data unit corresponding to a lower error rate separately on a different channel. *See. e.g.*, Yi at [0007], [0009]. In addition, a person of ordinary skill in the art would be motivated to combine Kawakami with Yi because (a) Kawakami and Yi disclose similar systems, apparatus, and method related to packet retransmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to systems, apparatuses, or methods for the improvement of quality of service for data transmission technology. Moreover, a POSITA would have had a reasonable

expectation of success in incorporating the teachings of Yi with those of Kawakami. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kawakami with other references in Exhibits F9-055A – F9-055D and F9 Secondary-055 with similar teachings.

(3) Exemplary Petranovich Solutions

A person of ordinary skill in the art would be motivated to combine Petranovich with TS 125 322 for many reasons. For example, Petranovich describes a MAC layer protocol involving transmission and retransmission of packets. *E.g.*, Petranovich at 2:66-3:22. A person having ordinary skill in the art would have been motivated to modify Petranovich to implement the details TS 125 322, including the model and protocol for retransmission taught by TS 125 322 because, it is also directed at to communication technologies involving transmission and retransmission of packets. *E.g.*, TS 125 322 at §§ 1, 4.2.1.3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the multiple modes for transmission and detailed explanation of implementation. *E.g.*, TS 125 322 at §§ 1, 4.2, 6.1. In addition, a person of ordinary skill in the art would be motivated to combine Petranovich with TS 125 322 because (a) Petranovich and TS 125 322 disclose similar systems, apparatus, and method related to packet retransmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to systems, apparatuses, or methods for the improvement of quality of service for data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of TS 125 322 with those of Petranovich. For similar reasons, a person of ordinary skill in the art would be motivated to combine Petranovich with other references in Exhibits F9-055A – F9-055D and F9 Secondary-055 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Petranovich with Kawakami for many reasons. For example, Petranovich describes a MAC layer protocol involving transmission and retransmission of packets. *E.g.*, Petranovich at 2:66-3:22. A person having ordinary skill in the art would have been motivated to modify Petranovich to implement the details of improved quality and performance of mobile equipment in reducing the establishment of radio protocol connections taught by Kawakami because, it is also directed at to communication technologies involving transmission and retransmission of packets. *E.g.*, Kawakami at Abstract, [0003], [0006]. In addition, a person of ordinary skill in the art would be motivated to combine Petranovich with Kawakami because (a) Petranovich and Kawakami disclose similar systems, apparatus, and method related to packet retransmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to systems, apparatuses, or methods for the improvement of quality of service for data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Kawakami with those of Petranovich. For similar reasons, a person of ordinary skill in the art would be motivated to combine Petranovich with other references in Exhibits F9-055A – F9-055D and F9 Secondary-055 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Petranovich with Yi for many reasons. For example, Petranovich describes a MAC layer protocol involving transmission and retransmission of packets. *E.g.*, Petranovich at 2:66-3:22. A person having ordinary skill in the art would have been motivated to modify Petranovich to implement the details of generating protocol data units in a split mode taught by Yi because, it is also directed at to communication technologies involving transmission and retransmission of packets. *E.g.*, Yi at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such

functionality, such as using a split mode to transport portions of a data unit corresponding to a lower error rate separately on a different channel. *See. e.g.*, Yi at [0007], [0009]. In addition, a person of ordinary skill in the art would be motivated to combine Petranovich with Yi because (a) Petranovich and Yi disclose similar systems, apparatus, and method related to packet retransmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to systems, apparatuses, or methods for the improvement of quality of service for data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Yi with those of Petranovich. For similar reasons, a person of ordinary skill in the art would be motivated to combine Petranovich with other references in Exhibits F9-055A – F9-055D and F9 Secondary-055 with similar teachings.

(4) Exemplary Yi Solutions

A person of ordinary skill in the art would be motivated to combine Yi with TS 125 322 for many reasons. For example, Yi describes transmission and retransmission of packets using a split mode. *E.g.*, Yi at Abstract, [0009]. A person having ordinary skill in the art would have been motivated to modify Yi to implement the details TS 125 322, including the model and protocol for retransmission taught by TS 125 322 because, it is also directed at to communication technologies involving transmission and retransmission of packets. *E.g.*, TS 125 322 at §§ 1, 4.2.1.3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the multiple modes for transmission and detailed explanation of implementation. *E.g.*, TS 125 322 at §§ 1, 4.2, 6.1. In addition, a person of ordinary skill in the art would be motivated to combine Yi with TS 125 322 because (a) Yi and TS 125 322 disclose similar systems, apparatus, and method related to packet retransmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to systems, apparatuses, or methods for the

improvement of quality of service for data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of TS 125 322 with those of Yi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yi with other references in Exhibits F9-055A – F9-055D and F9 Secondary-055 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yi with Kawakami for many reasons. For example, Yi describes transmission and retransmission of packets using a split mode. *E.g.*, Yi at Abstract, [0009]. A person having ordinary skill in the art would have been motivated to modify Yi to implement the details of improved quality and performance of mobile equipment in reducing the establishment of radio protocol connections taught by Kawakami because, it is also directed at to communication technologies involving transmission and retransmission of packets. *E.g.*, Kawakami at Abstract, [0003], [0006]. In addition, a person of ordinary skill in the art would be motivated to combine Yi with Kawakami because (a) Yi and Kawakami disclose similar systems, apparatus, and method related to packet retransmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to systems, apparatuses, or methods for the improvement of quality of service for data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Kawakami with those of Yi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yi with other references in Exhibits F9-055A – F9-055D and F9 Secondary-055 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yi with Kawakami for many reasons. For example, Yi describes transmission and retransmission of packets using a split mode. *E.g.*, Yi at Abstract, [0009]. A person having ordinary skill in the art would have been

motivated to modify Yi to implement the details TS 125 322, including the model and protocol for retransmission taught by TS 125 322 because, it is also directed at to communication technologies involving transmission and retransmission of packets. *E.g.*, TS 125 322 at §§ 1, 4.2.1.3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the multiple modes for transmission and detailed explanation of implementation. *E.g.*, TS 125 322 at §§ 1, 4.2, 6.1. In addition, a person of ordinary skill in the art would be motivated to combine Yi with Kawakami because (a) Yi and Kawakami disclose similar systems, apparatus, and method related to packet retransmission and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to systems, apparatuses, or methods for the improvement of quality of service for data transmission technology. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Kawakami with those of Yi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yi with other references in Exhibits F9-055A – F9-055D and F9 Secondary-055 with similar teachings.

(5) Exemplary Obviousness Reference Solutions

A person of ordinary skill in the art would be motivated to combine TS 125 322, Kawakami, Petranovich, and Yi (the “Primary References”) with the Secondary References for many reasons. As described above, each of the primary references teach systems, apparatuses, or methods related to communication technologies involving transmission and retransmission of packets in a communication environment. *See* Sections VII.B.3.e.(1)-(4). A person having ordinary skill in the art would have been motivated to modify the Primary References to implement the details of the Secondary References because they are also directed to systems, apparatuses, or methods related to communication technologies involving transmission and retransmission of

packets in a communication environment. For example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of very high bit-rate digital transmission on VDSL, including transport of delay-sensitive and delay-insensitive services as well as specific manner of formatting of frames using codewords. *E.g.*, TS 101 270 at § 1, 6.1.1. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of codewords and transport of delay-sensitive and delay-insensitive services. *E.g.*, G.993.1 at Annex H. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of FEC that includes adjusting the code rate of the FEC and lowering the burden on a receiver. *E.g.*, Sayeed at 2:12-3:7. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of FEC and of one-step real time interleaving to reduce performance bottlenecks. *E.g.*, Pan at 2:49-3:38. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of FEC that use an inner and outer codewords to improve error correction. *E.g.*, Itoh at [0014]-[0019]. In addition, a person of ordinary skill in the art would be motivated to combine any Primary Reference with and Secondary reference because (a) each reference discloses similar products, such as systems and apparatuses, or methods used by such, to improve the quality of service of communications and (b) the references are analogous art and in the same field of endeavor as each other, for example, relate to communication technologies involving transmission and retransmission of packets. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Secondary References with those of the Primary References. For similar reasons, a person of ordinary skill in the art would be motivated to combine

the Primary References with other references in Exhibits F9-055A – F9-055D and F9 Secondary-055 with similar teachings.

f) The Claims Recite Well-Known Concepts That Would Have Been Obvious to Implement.

The Asserted Claims represent nothing more than an arrangement of well-known concepts and features and add nothing to the state of the art at the time of the alleged invention. For each of the concepts represented by the Asserted Claims, it would have been obvious to add to the teachings of any number of known products and references, including to the teachings of any of the primary references in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809 to the extent that such reference is alleged to be missing such concept or feature. The following are examples of concepts that would have been obvious, which is not intended to be an exhaustive list of the claimed features that would have been obvious. Nokia Defendants reserve the right to supplement these examples as necessary.

(1) It would have been obvious to modify any primary reference for “wherein the transceiver is operable to receive at least one retransmitted packet using interleaving” or “wherein the transceiver is operable to retransmit at least one packet using interleaving”

To the extent TQ Delta contends that any reference charted in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809 does not disclose “wherein the transceiver is operable to receive at least one retransmitted packet using interleaving” or “wherein the transceiver is operable to retransmit at least one packet using interleaving” it would have been obvious to combine such

a well-known feature with any of the references charted in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809. A person having ordinary skill in the art would recognize that any disclosure that discloses transmitting via interleaving inherently discloses retransmitting via interleaving. Accordingly, a person of ordinary skill in the art would have been motivated to employ or implement that feature in a retransmission as well as a transmission. *See* ITU-T G993.1 at 64 (“the REPEAT_Request message shall be able to ask for the retransmission of a particular segment of a message”); 15 (“When the interleaver is on, the codewords shall be interleaved before transmission to increase the immunity of RS codewords to bursts of errors.”). Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(2) It would have been obvious to modify any primary reference to include “wherein an SNR margin of the at least one message is greater than an SNR margin of the packet” in any configuration.

To the extent TQ Delta contends that any reference charted in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809 does not disclose “wherein an SNR margin of the at least one message is greater than an SNR margin of the packet” it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809. A person having ordinary skill in the art would recognize that

a packet sent using interleaving is going to have an SNR margin that is lower than a message received without interleaving. For example, ITU-T G.993.1 explains that “bits in the slow buffer shall be assigned to tones with the highest SNRs,” and that “errors on these tones due to clipping can be corrected by the combination of interleaving and RS coding.” ITU-T G.993.1 at 29. Accordingly, a person of ordinary skill in the art would have understood that such a feature is inherent in interleaving. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(3) It would have been obvious to modify any primary reference to include “wherein the SNR margin of the at least one message is greater than 6 dB” in any configuration.

To the extent TQ Delta contends that any reference charted in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809 does not disclose “wherein the SNR margin of the at least one message is greater than 6 dB” it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809. A person having ordinary skill in the art would recognize that operating above 6 dB was a well-known concept. Indeed, the ’4473 patent explains that the “normal” SNR margin for “xDSL systems” is “6 dB,” but that increasing that margin could give it “a higher immunity to channel noise.” ’4473 Patent at 16:32–36. Further, ITU-T G.993.1, which is the standards for VDSL, contemplates SNR in the range of -31.75 dB to 31.75 dB, depending on direction. ITU-T

G.993.1 at 49. Accordingly, a person of ordinary skill in the art would have understood that such a feature is inherent in interleaving. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(4) It would have been obvious to modify any primary reference for “wherein a message transmitted during initialization indicates how the memory has been allocated between the retransmission function and the interleaving and/or deinterleaving function in the transceiver”

To the extent TQ Delta contends that any reference charted in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809 does not disclose “wherein a message transmitted during initialization indicates how the memory has been allocated between the retransmission function and the interleaving and/or deinterleaving function in the transceiver,” it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809. A person having ordinary skill in the art would have been motivated to employ or implement that feature. *See* ITU-T G.993.1 at 62 (“Initialization of a VTU-O/VTU-R pair includes a variety of tasks,” including “Exchange of parameters (RS settings, interleaver parameters, VOC settings, bit loading and energy tables, . . .). At least the requirement of transmitting or receiving a message during initialization is a requisite step in DSL communications, thus, a person of ordinary skill in the art would have been motivated, at the time of the invention, to employ or implement that feature. Indeed, employing initialization steps that

includes generating and transmitting a message would have accomplished the goal of initializing the transceiver for data transmission. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(5) It would have been obvious to modify any primary reference for “wherein a sum of a maximum amount of the memory that can be allocated to the retransmission function and a maximum amount of the memory that can be allocated to the interleaving/deinterleaving function is more than a total amount of the memory.”

To the extent TQ Delta contends that any reference charted in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809 does not disclose “wherein a sum of a maximum amount of the memory that can be allocated to the retransmission function and a maximum amount of the memory that can be allocated to the interleaving/deinterleaving function is more than a total amount of the memory.,” it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809. A person having ordinary skill in the art would have been motivated to employ or implement that feature. See Mazzoni at 2:37–49 (“More specifically, the channel coding/decoding stage may include Reed-Solomon coding/decoding means of length N (where $N=240$ bytes, for example). The interleaving means are then adapted to effect convolutional interleaving of I branches with $i-1$ blocks of N bytes. The deinterleaving means are adapted to implement convolutional deinterleaving with I' branches of $i'-1$ blocks of M' bytes. I and I' are sub-multiples of N , and i

and i' are the current relative indexes of the branches. The size in bytes of the first memory space is equal to $I \times (I-1) \times M/2$, and the size in bytes of the second memory space is equal to $I' \times (I'-1) \times M'/2$. The sizes of the two memory spaces are set by I , I' , M and M' .”). Moreover, Mazzoni explains that “[t]he size of each of the two memory spaces [for the interleaver and deinterleaver] may be set as a function of the bit rate actually processed by the device.” Mazzoni at Abstract. A person of ordinary skill in the art would thus have been motivated to employ that feature to fully utilize such a flexible memory allocation feature as disclosed in Mazzoni. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

g) Additional Reasons to Combine.

In addition to the information contained elsewhere in these invalidity contentions, including in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F809J and F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809, Nokia Defendants have identified additional motivations and reasons to combine the various references. Nokia Defendants note that in *KSR Int’l Co. v. Teleflex Inc.*, the Supreme Court held that “[i]n determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. What matters is the objective reach of the claim. If the claim extends to what is obvious, it is invalid under § 103.” 127 S. Ct. 1727, 1742 (2007).

KSR further illustrated several ways in which the subject matter of a patent claim may be shown to have been obvious. For instance, “[o]ne of the ways in which a patent’s subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for

which there was an obvious solution encompassed by the patent’s claims.” *KSR*, 127 S. Ct. at 1742. The Supreme Court held that it was error to “look only to the problem the patentee was trying to solve.” *Id.* As the Court explained, “[t]he question is not whether the combination was obvious to the patentee but whether the combination was obvious to a person with ordinary skill in the art. Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *Id.* Further, “[c]ommon sense teaches ... that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle.” *Id.* Further, a showing that a combination of elements was “obvious to try” may demonstrate that it was obvious under § 103. *Id.* For instance, the Supreme Court held that “predictable solutions” using a combination of “known options” may render the subject matter of a patent claim obvious. *Id.*

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product was not of innovation but of ordinary skill and common sense. *Id.* The ways in which the subject matter of a patent claim may be shown to be obvious, identified by *KSR*, are merely illustrative. A core thrust of *KSR* was that “[r]igid preventative rules that deny factfinders recourse to common sense are neither necessary under our case law nor consistent with it.” *KSR*, 127 S. Ct. at 1742-43 (quoting *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1367 (Fed. Cir. 2006) (“Our suggestion test is in actuality quite flexible and not only permits, but requires, consideration of common knowledge and common sense”), and *Alza Corp. v. Mylan Labs., Inc.*, 464 F.3d 1286, 1291 (Fed. Cir. 2006) (“There is flexibility in our

obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires an actual teaching to combine ...”).

Although Nokia Defendants note that there is no longer a rigid requirement regarding motivation to combine under *KSR*, Nokia Defendants provide the following statements regarding motivation to combine. Multiple teachings, suggestions, and/or reasons to modify any of the references and/or to combine any two or more of the references in Exhibits F9-411A – F9-411E, F9-577A- F9-577J, F9-348A – F9-348J, F9-055A – F9-055D, F9-4473A – F9-4473J, F9-809A – F9-809J and F9 Secondary-411, F9 Secondary-577, F9 Secondary-348, F9 Secondary-055, F9 Secondary-4473, F9 Secondary-809 come from many sources, including the prior art (specific and as a whole), common knowledge, common sense, predictability, expectations, industry trends, design incentives or need, market demands or pressure, market forces, obvious to try, the nature of the problem faced, and/or knowledge possessed by one of ordinary skill. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one.

The combination of prior art references identified in these contentions would have been obvious because the combination represents the known potential options with a reasonable expectation of success. Additionally, one of ordinary skill in the art would have been motivated to create combinations identified in these contentions using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or teaching, suggestion, or motivation in the prior art generally. Also, market forces in the industry, and the desire to improve features and performance,

would motivate the addition of features to systems as they became available, became less expensive, became more commonly used, provided better performance, reduced costs, size or weight, or predictably achieved other desirable results.

C. Other Grounds for Invalidity

Nokia Defendants identify the following additional grounds for invalidity of the Asserted Claims of the Family 9 Patents. Nokia Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

1. Invalidity of the Family 9 Patents Based on 35 U.S.C. § 112, ¶ 1 (Enablement and Written Description)

Based on Nokia Defendants' present understanding of TQ Delta's asserted scope of the claims of the Family 9 Patents, to the extent such positions can be understood from TQ Delta's Preliminary Infringement Contentions, the Asserted Claims of the Family 9 Patents are invalid for reciting at least the following claim terms, phrases, or limitations that lack enablement or sufficient written description:

“allocating a memory between a retransmission function and an interleaving and/or deinterleaving function” ('411 Patent, claim 10 and 18)

“wherein at least a portion of the memory may be allocated to the retransmission function or to the interleaving and/or deinterleaving function at any one particular time” ('411 Patent, claim 10 and 18)

“indicates how the memory has been allocated between the retransmission function or to the interleaving and/or deinterleaving function in the transceiver” ('411 Patent, claim 10)

“receive at least one packet using deinterleaving” ('577 Patent, claims 16, 30)

“receive at least one retransmitted packet using interleaving” ('577 Patent, claims 17, 31)

“[transmit/retransmit] at least one packet using interleaving” ('577 Patent, claims 37, 38, 53, 54)

“wherein the at least one packed comprises one or more PTM-TC codewords” ('577 Patent, claims 16, 37)

“wherein the [first type of] packet comprises a header field and a plurality of PTM-TC [Packet Transfer Mode codewords]” (’348 Patent, claims 1, 9; ’055 Patent, claim 17)

“[transmit/receive] a packet using a forward error correction [encoder/decoder] and [a/an interleaver/deinterleaver]” (’348 Patent, claims 1, 9)

“transmitting, by the transceiver, a packet using a forward error correction encoder and an interleaver” (’4473 Patent, claim 1)

“[transmitting or transmit/receiving or receive] a packet using forward error correction [encoding/decoding] and [interleaving/deinterleaving]” (’809 Patent, claims 1, 8, 15, 22)

“[retransmit/retransmitting] the packet using [the] forward error correction [encoder/encoding] and [the interleaver/interleaving]” (’348 patent, claim 3; ’4473 Patent, claim 3; ’809 Patent, claims 3, 17)

“[receive/receiving] a retransmitted packet using [the] forward error correction [decoder/decoding] and [the deinterleaver/deinterleaving]” (’348 Patent, claim 11; ’809 Patent, claims 10, 24)

“wherein an SNR margin of the at least one message is greater than an SNR margin of the packet” (’4473 Patent, claim 1)

“wherein a physical layer of the transceiver is capable of generating the packet and the message” (’809 Patent, claims 4, 6, 11, 13)

“wherein instructions further cause a physical layer of the transceiver to generate the packet and the message” (’809 Patent, claims 18, 20, 25, 27)

These claim terms, phrases, and limitations, as apparently construed by TQ Delta, fail to satisfy the enablement and/or written description requirements of 35 U.S.C. § 112. This is at least because the specifications of the Family 9 Patents demonstrate that the patentee neither conceived of nor demonstrated possession of all that TQ Delta now contends the claims cover. In addition, based on Defendant’s present understanding of TQ Delta’s Preliminary Infringement Contentions, each of the Asserted Claims of the Family 9 Patents in which these claim terms, phrases, and limitations appear is invalid because the specification fails to provide sufficient disclosure to enable a person of ordinary skill in the art to which the alleged invention pertains, or with which it is most nearly connected, to implement the alleged invention without undue experimentation.

2. Invalidity of the Family 9 Patents Based on 35 U.S.C. § 112, ¶ 2 (Indefiniteness)

Based on Nokia Defendants' present understanding of TQ Delta's asserted scope of the claims of the Family 9 Patents, to the extent such positions can be understood from TQ Delta's Preliminary Infringement Contentions, Nokia Defendants assert that the Asserted Claims of the Family 9 Patents are invalid for reciting at least the following indefinite claim terms, phrases, or limitations:

- “allocating a memory between a retransmission function and an interleaving and/or deinterleaving function” ('411 Patent, claim 10 and 18)
- “wherein at least a portion of the memory may be allocated to the retransmission function or to the interleaving and/or deinterleaving function at any one particular time” ('411 Patent, claim 10 and 18)
- “indicates how the memory has been allocated between the retransmission function or to the interleaving and/or deinterleaving function in the transceiver” ('411 Patent, claim 10)
- “receive at least one packet using deinterleaving” ('577 Patent, claims 16, 30)
- “receive at least one retransmitted packet using interleaving” ('577 Patent, claims 17, 31)
- “[transmit/retransmit] at least one packet using interleaving” ('577 Patent, claims 37, 38, 53, 54)
- “wherein the at least one packed comprises one or more PTM-TC codewords” ('577 Patent, claims 16, 37)
- “wherein the [first type of] packet comprises a header field and a plurality of PTM-TC [Packet Transfer Mode codewords” ('348 Patent, claims 1, 9; '055 Patent, claim 17)
- “[transmit/receive] a packet using a forward error correction [encoder/decoder] and [a/an interleaver/deinterleaver]” ('348 Patent, claims 1, 9)
- “transmitting, by the transceiver, a packet using a forward error correction encoder and an interleaver” ('4473 Patent, claim 1)
- “[transmitting or transmit/receiving or receive] a packet using forward error correction [encoding/decoding] and [interleaving/deinterleaving]” ('809 Patent, claims 1, 8, 15, 22)

“[retransmit/retransmitting] the packet using [the] forward error correction [encoder/encoding] and [the interleaver/interleaving]” (’348 patent, claim 3; ’4473 Patent, claim 3; ’809 Patent, claims 3, 17)

“[receive/receiving] a retransmitted packet using [the] forward error correction [decoder/decoding] and [the deinterleaver/deinterleaving]” (’348 Patent, claim 11; ’809 Patent, claims 10, 24)

“wherein an SNR margin of the at least one message is greater than an SNR margin of the packet” (’4473 Patent, claim 1)

“wherein a physical layer of the transceiver is capable of generating the packet and the message” (’809 Patent, claims 4, 6, 11, 13)

“wherein instructions further cause a physical layer of the transceiver to generate the packet and the message” (’809 Patent, claims 18, 20, 25, 27)

These claim terms, phrases, and limitations, as apparently construed by TQ Delta, violate the definiteness requirements of 35 U.S.C. § 112.

Based on Nokia Defendants’ present understanding of TQ Delta’s Preliminary Infringement Contentions, these claim terms, phrases, and limitations are indefinite because they are inconsistent with and broader than the alleged invention disclosed in the specification and during prosecution. And given TQ Delta’s apparent constructions of the claim terms, phrases, and limitations, persons of ordinary skill in the art at the time of the invention would not have understood what is claimed with reasonable certainty, even when the claims are read in light of the specification and prosecution history.

3. Additional Grounds for Invalidity of the Family 9] Patents

In addition to the preceding invalidity contentions, Nokia Defendants reserve the right to assert that the Asserted Claims are invalid under 35 U.S.C. § 102(f) and/or § 102(g) in the event that Nokia Defendants obtain evidence that the named inventors of the Family 9 Patents did not invent (either alone or in conjunction with other parties) the subject matter claimed in the Family 9 Patents. Should Nokia Defendants obtain such evidence, Nokia Defendants will provide the

name of the person(s) from whom and the circumstances under which the invention or any part of it was derived, and/or the circumstances surrounding the making of the invention before the patent application.

4. Double Patenting

The expiration date for U.S. Patent No. 8,595,577 is August 28, 2017. U.S. Patent Nos. 9,094,348, 10,044,473, and 10,833,809 expire on April 12, 2027, which is earlier than the '577 patent. The claims of the '577 patent are invalid for obvious-type double patenting over the claims of the '348, '4473, and '809 patents.

Nokia Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

VIII. THE ASSERTED FAMILY 10 PATENTS ARE INVALID.

A. Identification of Prior Art

Nokia Defendants contend that the prior art references described and charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 anticipate and/or render obvious, alone or in combination, one or more of the Asserted Claims of the Family 10 Patents.

B. The Asserted Claims Are Anticipated and/or Rendered Obvious.

TQ Delta asserts claims 16 and 22 of '988 Patent and claims 10, 11, and 12 of the '354 Patent against Nokia Defendants in this lawsuit. These claims are invalid because the Family 10 Patents fail to meet one or more of the requirements for patentability. The individual bases for invalidity are provided below and in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354. Each of the prior art references, the underlying work, and/or the underlying apparatus or method qualifies as prior art under one or more sections of 35 U.S.C. §§ 102 and/or 103.

In an effort to focus the issues, Nokia Defendants have cited representative portions of identified references, even where a reference may contain additional disclosures or support for a particular claim element. Each and every disclosure of the same limitation in the same reference is not necessarily identified. In addition, persons of ordinary skill in the art generally read a prior art reference as a whole and in the context of other publications and literature and in the context of their knowledge as persons of ordinary skill in the art. Thus, to understand and interpret any specific statement or disclosure within a prior art reference, such persons would rely on other information within the reference, along with other publications and their general scientific knowledge and experience in the field. Thus, each prior art reference identified herein should be understood in the context of the reference itself, in conjunction with anything incorporated by reference or described as relevant technology by the reference, any documents that are referred to for further understanding by the reference, any system embodying the reference, and any testimony by those with knowledge of the reference, such as the named authors and inventors. Nokia Defendants may rely on uncited portions of the prior art references and on other publications and expert testimony to provide context, and as aids to understanding and interpreting the portions that are cited. Nokia Defendants may also rely on uncited portions of the prior art references, other disclosed publications, and the testimony of experts to establish that a person of ordinary skill in the art would have been motivated to modify or combine certain of the cited references so as to render the claims obvious.

1. The Family 10 Patents' Priority Date.

TQ Delta's Preliminary Infringement Contentions allege that the Asserted Claims of the Family 10 Patents are entitled at least to the priority date April 18, 2000. To the extent TQ Delta alleges that any prior art relied on in these invalidity contentions does not qualify as prior art to an

Asserted Patent, Nokia Defendants reserve the right to rebut those allegations (*e.g.*, by demonstrating an earlier relevant date for the challenged prior art and/or a later priority date for the Asserted Patent and/or Asserted Claim).

2. The Family 10 Patents Are Anticipated and/or Rendered Obvious by the Prior Art.

Some or all of the Asserted Claims of the Family 10 Patents are invalid as anticipated and/or rendered obvious under 35 U.S.C. §§ 102 and/or 103 in view of each of the primary prior art references identified in the claim charts included in Exhibits F10-988A – F10-988F, F10-354A – F10-354F, which identify specific examples of where each limitation of the Asserted Claims is found in the prior art references. As explained above, the cited portions of prior art references identified in the attached claim charts are exemplary in nature and representative of the content and teaching of the prior art references, and should be understood in the context of the reference as a whole and as they would be understood by a person of ordinary skill in the art.

Nokia Defendants identify the following references as anticipating and/or rendering obvious one or more of the Asserted Claims of the Family 10 Patents under 35 U.S.C. §§ 102 and/or 103. The table of anticipating and/or rendering obvious references below is exemplary, and it does not constitute an admission that any reference not listed below does not also anticipate and/or render obvious the claims of the Family 10 Patents. Further, Nokia Defendants contend that any prior art reference in the attached charts that is charted for each limitation of any given claim, anticipates that claim, regardless of whether that prior art reference is listed in the following table.

Exhibits	Primary Prior Art	Date⁶
F10-988A F10-354A	U.S. Patent No. 6,516,027 to Kapoor et al. (“Kapoor”)	February 18, 1999
F10-988B F10-354B	U.S. Patent No. 6,084,917 to Kao et al. (“Kao”)	December 16, 1997
F10-988C F10-354C	U.S. Patent No. 6,205,410 to Cai (“Cai”)	October 13, 1998
F10-988D F10-354D	EP 0753948A1 to Peeters et al. (“Peeters”)	January 15, 1997
F10-988E F10-354E	U.S. Patent No. 6,122,247 to Levin et al. (“Levin 247”)	November 24, 1997
F10-988F F10-354F	U.S. Patent No. 6,310,909 to Jones (“Jones 909”)	May 11, 1999

To the extent any item of prior art cited above is deemed not to disclose and/or render obvious, explicitly or inherently, any limitation of an Asserted Claim of the Family 10 Patents, Nokia Defendants reserve the right to argue that any difference between that prior art and the corresponding patent claim would have been either inherent in the art or obvious to a person of ordinary skill in the art, even if Nokia Defendants have not specifically denoted that the art is to be combined with the knowledge of a person of ordinary skill in the art.

3. The Family 10 Patents Are Obvious Over the Prior Art.

To the extent TQ Delta argues that any limitation of the Asserted Claims of the Family 10 Patents are not explicitly disclosed and/or rendered obvious by an item of prior art identified above

⁶ Nokia Defendants reserve the right to identify additional bases for qualification as prior art for each of the identified references in the event that it is determined that the Asserted Patents are not entitled to the claimed priority date.

and in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354, any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. The item of prior art would, therefore, render such claims invalid as obvious under 35 U.S.C. § 103.

a) The Claims Are Obvious Over the Primary References in Light of One or More Secondary References.

To the extent the foregoing references are found not to anticipate and/or render obvious the Asserted Claims of the Family 10 Patents, the foregoing references render the Asserted Claims obvious, either alone or in combination with one or more of the other references identified above. One of ordinary skill in the art would have been motivated to combine the various references cited above and herein so as to disclose each and every limitation of the Asserted Claims of the Family 10 Patents.

Prior art references rendering the Asserted Claims of the Family 10 Patents obvious, either alone or in combination with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354, are provided in the table below and in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354. The prior art identified in Exhibits F10-988A – F10-988F, F10-354A – F10-354F render one or more asserted claims of the Family 10 Patents obvious when the references are read in combination with one or more of each other, when read in combination with any of the prior art identified in Exhibits F10-988A – F10-988F, F10-354A – F10-354F, and/or when read in view of the state of the art and knowledge of those skilled in the art.

F10 Secondary Exhibits	Date
WO 98/52312 to Chow (“Chow”)	November 19, 1998
U.S. Patent No. 6,700,927 to Eslinger et al. (“Eslinger”)	March 9, 2000
U.S. Patent No. 6,266,348 to Gross et al. (“Gross”)	February 11, 2000
U.S. Patent No. 5,400,322 to Hunt et al. (“Hunt 322”)	March 21, 1995
U.S. Patent No. 5,852,633 to Levin et al. (“Levin 633”)	December 22, 1998
U.S. Patent No. 5,812,599 to Van Kerckhove (“Van Kerckhove”)	September 22, 1998
Admitted Prior Art in the '988 Patent	
Admitted Prior Art in the '354 Patent	

To the extent TQ Delta argues that any Asserted Claim of the Family 10 Patents is not disclosed or rendered obvious by any Exhibits F10-988A – F10-988F, F10-354A – F10-354F reference, the Asserted Claims nevertheless would have been obvious in light of one or more other Exhibits F10-988A – F10-988F, F10-354A – F10-354F references and/or one or more references identified and charted in Exhibits F10 Secondary-988, F10 Secondary-354 and in view of the knowledge, experience, and understanding of persons of ordinary skill in the art.

Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with another to render obvious (and therefore invalid) each of TQ Delta’s Asserted Claims. Nokia Defendants may rely on a subset of (or all of) the above-identified references, including all references in Exhibits F10-

988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354, for purposes of obviousness depending on the Court’s claim construction, positions taken by TQ Delta during this litigation, and further investigation and discovery.

b) Exemplary Combinations of the Prior Art.

The table below provides an identification of exemplary combinations of prior art references that, based on Nokia Defendants’ present understanding of TQ Delta’s Preliminary Infringement Contentions and apparent reading of the Asserted Claims, render obvious one or more of the Asserted Claims of the Family 10 Patents. The combinations of references identified below are non-exhaustive, and additional examples are apparent from other combinations of references addressed in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354. Nokia Defendants expressly note that, although certain references charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F are listed variously in the left or right column below, Nokia Defendants do not thereby imply any restriction as to which Exhibits F10-988A – F10-988F, F10-354A – F10-354F reference is primary and which Exhibits F10-988A – F10-988F, F10-354A – F10-354F reference is secondary in such a combination. Nokia Defendants reserve the right to rely on either identified reference in the identified combinations as a primary and/or secondary reference.

Reference	Combination References
Kapoor	Kao, Cai, Peeters, Levin 247, Jones 909, and/or one or more references charted in Exhibits F10 Secondary-988, F10 Secondary-354
Kao	Kapoor, Cai, Peeters, Levin 247, Jones 909, and/or one or more references charted in Exhibits F10 Secondary-988, F10 Secondary-354
Cai	Kapoor, Kao, Peeters, Levin 247, Jones 909, and/or one or more references charted in Exhibits F10 Secondary-988, F10 Secondary-354
Peeters	Kapoor, Kao, Cai, Levin 247, Jones 909, and/or one or more references charted in Exhibits F10 Secondary-988, F10 Secondary-354
Levin 247	Kapoor, Kao, Cai, Peeters, Jones 909, and/or one or more references charted in Exhibits F10 Secondary-988, F10 Secondary-354
Jones 909	Kapoor, Kao, Cai, Peeters, Levin 247, and/or one or more references charted in Exhibits F10 Secondary-988, F10 Secondary-354

It would have been obvious to combine these references for reasons that are readily apparent to one of ordinary skill in the art, and for reasons explained herein.

c) Prior Art Solutions

In addition to the exemplary combinations provided above, to the extent TQ Delta alleges the references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 do not disclose any particular limitation of the Asserted Claims of the Family 10 Patents, either expressly or inherently, it would have been obvious to a person of ordinary skill in the art as of the alleged invention date of the Family 10 Patents to modify the references in

Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 and/or combine the teachings of the references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with the other prior art references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 in a manner that would have rendered the Asserted Claims invalid as obvious. Nokia Defendants provide examples of such combinations below. The exemplary combinations below are non-exhaustive, and Nokia Defendants reserve the right to rely on additional combinations as may be apparent from the prior art references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354. These obviousness combinations should not be construed to suggest that any reference included in any combination is not anticipatory in its own right.

(1) Exemplary Kapoor Solutions

A person of ordinary skill in the art would be motivated to combine Kapoor with Kao for many reasons. For example, Kapoor describes communication technologies involving multicarrier modulation, including DMT communication devices that take into account characteristics of individual carriers during bit loading. *E.g.*, Kapoor at 4:5-21, 4:24-55. A person having ordinary skill in the art would have been motivated to modify Kapoor to implement the details of adaptable bit and energy configurations of sub-channels taught by Kao because it is also directed at communication technologies involving improving multicarrier modulation. *E.g.*, Kao at Abstract, 1:29-35, 6:9-19. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for improved data throughput, bit error rate, and power margin performance as well as. *E.g.*, Kao at *id.* In addition, a person of ordinary skill in the art would be motivated to combine Kapoor with Kao because (a) Kapoor and Kao disclose similar products,

such as similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Kao with those of Kapoor. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kapoor with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kapoor with Cai for many reasons. For example, Kapoor describes communication technologies involving multicarrier modulation, including DMT communication devices that take into account characteristics of individual carriers during bit loading. *E.g.*, Kapoor at 4:5-21, 4:24-55. A person having ordinary skill in the art would have been motivated to modify Kapoor to implement the details of “optimization of the signal-to-noise ratio margin of DMT channels” taught by Cai because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Cai at 1:13-16, 1:65-2:21. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for “determining a variation in a signal-to-noise ratio for each of the channels, and, determining a bit loading configuration for each of the channels based on the [] variation.” *E.g.*, Cai at 2:16-21. In addition, a person of ordinary skill in the art would be motivated to combine Kapoor with Cai because (a) Kapoor and Cai disclose similar products, such as similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies

involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Cai with those of Kapoor. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kapoor with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kapoor with Peeters for many reasons. For example, Kapoor describes communication technologies involving multicarrier modulation, including DMT communication devices that take into account characteristics of individual carriers during bit loading. *E.g.*, Kapoor at 4:5-21, 4:24-55. A person having ordinary skill in the art would have been motivated to modify Kapoor to implement the details of “data element allocation and transmission for each type of data” such that each is “tuned to its own specification” as taught by Peeters because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Peeters at 2:26-28. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for tuning each type of data to its own specifications. *E.g.*, *id.* In addition, a person of ordinary skill in the art would be motivated to combine Kapoor with Peeters because (a) Kapoor and Peeters disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Peeters with those of Kapoor. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kapoor

with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kapoor with Levin 247 for many reasons. For example, Kapoor describes communication technologies involving multicarrier modulation, including DMT communication devices that take into account characteristics of individual carriers during bit loading. *E.g.*, Kapoor at 4:5-21, 4:24-55. A person having ordinary skill in the art would have been motivated to modify Kapoor to implement the details of “reallocating data between carriers” taught by Levin 247 because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Levin 247 at 1:14-17. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for “an efficient method of performing swapping,” including provisions for error correction techniques, in a multicarrier modulation. *E.g.*, Levin 247 at 1:14-17, 2:22-51, 8:1-9. In addition, a person of ordinary skill in the art would be motivated to combine Kapoor with Levin 247 because (a) Kapoor and Levin 247 disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Levin 247 with those of Kapoor. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kapoor with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kapoor with Jones 909 for many reasons. For example, Kapoor describes communication technologies involving

multicarrier modulation, including DMT communication devices that take into account characteristics of individual carriers during bit loading. *E.g.*, Kapoor at 4:5-21, 4:24-55. A person having ordinary skill in the art would have been motivated to modify Kapoor to implement the details of enhancing the bit rate and margin as well as varying stop and stop frequencies taught by Jones 909 because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Jones 909 at 3:66-4:18, 4:25-35. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for regarding achieving an “enhanced bit rate and/or noise margin.” *E.g.*, Jones 909 at 7:20-40. In addition, a person of ordinary skill in the art would be motivated to combine Kapoor with Jones 909 because (a) Kapoor and Jones 909 disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Jones 909 with those of Kapoor. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kapoor with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

(2) Exemplary Kao Solutions

A person of ordinary skill in the art would be motivated to combine Kao with Kapoor for many reasons. For example, Kao describes communication technologies involving multicarrier modulation, including adaptable bit and energy configurations of sub-channels. *E.g.*, Kao at Abstract, 1:29-35, 6:6-19. A person having ordinary skill in the art would have been motivated to modify Kao to implement details of Kapoor, including accounting for different carrier

characteristics taught by Kapoor because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Kapoor at 4:24-55. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as how it “eliminates the need for the communication device to conduct complex and time consuming calculations.” *E.g.*, Kapoor at Abstract, 1:7-15. In addition, a person of ordinary skill in the art would be motivated to combine Kao with Kapoor because (a) Kao and Kapoor disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Kapoor with those of Kao. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kao with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kao with Cai for many reasons. For example, Kao describes communication technologies involving multicarrier modulation, including adaptable bit and energy configurations of sub-channels. *E.g.*, Kao at Abstract, 1:29-35, 6:6-19. A person having ordinary skill in the art would have been motivated to modify Kao to implement the details of “optimization of the signal-to-noise ratio margin of DMT channels” taught by Cai because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Cai at 1:13-16, 1:65-2:21. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for “determining a variation in a signal-to-noise ratio for each of the channels, and, determining a bit loading configuration for each of the channels based on the [] variation.” *E.g.*, Cai at 2:16-21. In addition,

a person of ordinary skill in the art would be motivated to combine Kao with Cai because (a) Kao and Cai disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Cai with those of Kao. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kao with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kao with Peeters for many reasons. For example, Kao describes communication technologies involving multicarrier modulation, including adaptable bit and energy configurations of sub-channels. *E.g.*, Kao at Abstract, 1:29-35, 6:6-19. A person having ordinary skill in the art would have been motivated to modify Kao to implement the details of “data element allocation and transmission for each type of data” such that each is “tuned to its own specification” as taught by Peeters because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Peeters at 2:26-28. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for tuning each type of data to its own specifications. *E.g.*, *id.* In addition, a person of ordinary skill in the art would be motivated to combine Kao with Peeters because (a) Kao and Peeters disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have

had a reasonable expectation of success in incorporating the teachings of Peeters with those of Kao. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kao with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kao with Levin 247 for many reasons. For example, Kao describes communication technologies involving multicarrier modulation, including adaptable bit and energy configurations of sub-channels. *E.g.*, Kao at Abstract, 1:29-35, 6:6-19. A person having ordinary skill in the art would have been motivated to modify Kao to implement the details of “reallocating data between carriers” taught by Levin 247 because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Levin 247 at 1:14-17. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for “an efficient method of performing swapping,” including provisions for error correction techniques, in a multicarrier modulation. *E.g.*, Levin 247 at 1:14-17, 2:22-51, 8:1-9. In addition, a person of ordinary skill in the art would be motivated to combine Kao with Levin 247 because (a) Kao and Levin 247 disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Levin 247 with those of Kao. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kao with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kao with Jones 909 for many reasons. For example, Kao describes communication technologies involving multicarrier modulation, including adaptable bit and energy configurations of sub-channels. *E.g.*, Kao at Abstract, 1:29-35, 6:6-19. A person having ordinary skill in the art would have been motivated to modify Kao to implement the details of enhancing the bit rate and margin as well as varying stop and stop frequencies taught by Jones 909 because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Jones 909 at 3:66-4:18, 4:25-35. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for regarding achieving an “enhanced bit rate and/or noise margin.” *E.g.*, Jones 909 at 7:20-40. In addition, a person of ordinary skill in the art would be motivated to combine Kao with Jones 909 because (a) Kao and Jones 909 disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Jones 909 with those of Kao. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kao with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

(3) Exemplary Cai Solutions

A person of ordinary skill in the art would be motivated to combine Cai with Kapoor for many reasons. For example, Cai describes communication technologies involving multicarrier modulation, including “optimization of the signal-to-noise ratio margin of DMT channels”. *E.g.*, Cai at 1:13-16, 1:65-2:21. A person having ordinary skill in the art would have been motivated to

modify the Cai to implement details of Kapoor, including accounting for different carrier characteristics taught by Kapoor because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Kapoor at 4:24-55. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as how it “eliminates the need for the communication device to conduct complex and time consuming calculations.” *E.g.*, Kapoor at Abstract, 1:7-15. In addition, a person of ordinary skill in the art would be motivated to combine Cai with Kapoor because (a) Cai and Kapoor disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Kapoor with those of Cai. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cai with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Cai with Kao for many reasons. For example, Cai describes communication technologies involving multicarrier modulation, including “optimization of the signal-to-noise ratio margin of DMT channels”. *E.g.*, Cai at 1:13-16, 1:65-2:21. A person having ordinary skill in the art would have been motivated to modify the Cai to implement the details of adaptable bit and energy configurations of sub-channels taught by Kao because it is also directed at communication technologies involving improving multicarrier modulation. *E.g.*, Kao at Abstract, 1:29-35, 6:9-19. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for improved data throughput, bit error rate, and power margin performance as well as. *E.g.*, Kao at *id.* In

addition, a person of ordinary skill in the art would be motivated to combine Cai with Kao because (a) Cai and Kao disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Kao with those of Cai. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cai with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Cai with Peeters for many reasons. For example, Cai describes communication technologies involving multicarrier modulation, including “optimization of the signal-to-noise ratio margin of DMT channels”. *E.g.*, Cai at 1:13-16, 1:65-2:21. A person having ordinary skill in the art would have been motivated to modify the Cai to implement the details of “data element allocation and transmission for each type of data” such that each is “tuned to its own specification” as taught by Peeters because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Peeters at 2:26-28. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for tuning each type of data to its own specifications. *E.g.*, *id.* In addition, a person of ordinary skill in the art would be motivated to combine Cai with Peeters because (a) Cai and Peeters disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a

reasonable expectation of success in incorporating the teachings of Peeters with those of Cai. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cai with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Cai with Levin 247 for many reasons. For example, Cai describes communication technologies involving multicarrier modulation, including “optimization of the signal-to-noise ratio margin of DMT channels”. *E.g.*, Cai at 1:13-16, 1:65-2:21. A person having ordinary skill in the art would have been motivated to modify the Cai to implement the details of “reallocating data between carriers” taught by Levin 247 because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Levin 247 at 1:14-17. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for “an efficient method of performing swapping,” including provisions for error correction techniques, in a multicarrier modulation. *E.g.*, Levin 247 at 1:14-17, 2:22-51, 8:1-9. In addition, a person of ordinary skill in the art would be motivated to combine Cai with Levin 247 because (a) Cai and Levin 247 disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Levin 247 with those of Cai. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cai with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Cai with Jones 909 for many reasons. For example, Cai describes communication technologies involving multicarrier modulation, including “optimization of the signal-to-noise ratio margin of DMT channels”. *E.g.*, Cai at 1:13-16, 1:65-2:21. A person having ordinary skill in the art would have been motivated to modify the Cai to implement the details of enhancing the bit rate and margin as well as varying stop and stop frequencies taught by Jones 909 because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Jones 909 at 3:66-4:18, 4:25-35. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for regarding achieving an “enhanced bit rate and/or noise margin.” *E.g.*, Jones 909 at 7:20-40. In addition, a person of ordinary skill in the art would be motivated to combine Cai with Jones 909 because (a) Cai and Jones 909 disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Jones 909 with those of Cai. For similar reasons, a person of ordinary skill in the art would be motivated to combine Cai with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

(4) Exemplary Peeters Solutions

A person of ordinary skill in the art would be motivated to combine Peeters with Kapoor for many reasons. For example, Peeters describes communication technologies involving multicarrier modulation, including “data element allocation and transmission for each type of data” such that each is “tuned to its own specification.” *E.g.*, Peeters at 2:26-28. A person having

ordinary skill in the art would have been motivated to modify Peeters to implement details of Kapoor, including accounting for different carrier characteristics taught by Kapoor because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Kapoor at 4:24-55. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as how it “eliminates the need for the communication device to conduct complex and time consuming calculations.” *E.g.*, Kapoor at Abstract, 1:7-15. In addition, a person of ordinary skill in the art would be motivated to combine Peeters with Kapoor because (a) Peeters and Kapoor disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Kapoor with those of Peeters. For similar reasons, a person of ordinary skill in the art would be motivated to combine Peeters with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Peeters with Kao for many reasons. For example, Peeters describes communication technologies involving multicarrier modulation, including “data element allocation and transmission for each type of data” such that each is “tuned to its own specification.” *E.g.*, Peeters at 2:26-28. A person having ordinary skill in the art would have been motivated to modify Peeters to implement the details of adaptable bit and energy configurations of sub-channels taught by Kao because it is also directed at communication technologies involving improving multicarrier modulation. *E.g.*, Kao at Abstract, 1:29-35, 6:9-19. A person of ordinary skill in the art would be motivated by the advantages of such functionality,

such as the methods for improved data throughput, bit error rate, and power margin performance as well as. *E.g.*, Kao at *id.* In addition, a person of ordinary skill in the art would be motivated to combine Peeters with Kao because (a) Peeters and Kao disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Kao with those of Peeters. For similar reasons, a person of ordinary skill in the art would be motivated to combine Peeters with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Peeters with Cai for many reasons. For example, Peeters describes communication technologies involving multicarrier modulation, including “data element allocation and transmission for each type of data” such that each is “tuned to its own specification.” *E.g.*, Peeters at 2:26-28. A person having ordinary skill in the art would have been motivated to modify Peeters to implement the details of “optimization of the signal-to-noise ratio margin of DMT channels” taught by Cai because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Cai at 1:13-16, 1:65-2:21. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for “determining a variation in a signal-to-noise ratio for each of the channels, and, determining a bit loading configuration for each of the channels based on the [] variation.” *E.g.*, Cai at 2:16-21. In addition, a person of ordinary skill in the art would be motivated to combine Peeters with Cai because (a) Peeters and Cai disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both

patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Cai with those of Peeters. For similar reasons, a person of ordinary skill in the art would be motivated to combine Peeters with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Peeters with Levin 247 for many reasons. For example, Peeters describes communication technologies involving multicarrier modulation, including “data element allocation and transmission for each type of data” such that each is “tuned to its own specification.” *E.g.*, Peeters at 2:26-28. A person having ordinary skill in the art would have been motivated to modify Peeters to implement the details of “reallocating data between carriers” taught by Levin 247 because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Levin 247 at 1:14-17. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for “an efficient method of performing swapping,” including provisions for error correction techniques, in a multicarrier modulation. *E.g.*, Levin 247 at 1:14-17, 2:22-51, 8:1-9. In addition, a person of ordinary skill in the art would be motivated to combine Peeters with Levin 247 because (a) Peeters and Levin 247 disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Levin 247 with those of Peeters. For similar reasons, a person of ordinary skill in the art would be

motivated to combine Peeters with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Peeters with Jones 909 for many reasons. For example, Peeters describes communication technologies involving multicarrier modulation, including “data element allocation and transmission for each type of data” such that each is “tuned to its own specification.” *E.g.*, Peeters at 2:26-28. A person having ordinary skill in the art would have been motivated to modify Peeters to implement the details of enhancing the bit rate and margin as well as varying stop and stop frequencies taught by Jones 909 because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Jones 909 at 3:66-4:18, 4:25-35. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for regarding achieving an “enhanced bit rate and/or noise margin.” *E.g.*, Jones 909 at 7:20-40. In addition, a person of ordinary skill in the art would be motivated to combine Peeters with Jones 909 because (a) Peeters and Jones 909 disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Jones 909 with those of Peeters. For similar reasons, a person of ordinary skill in the art would be motivated to combine Peeters with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

(5) Exemplary Levin 247 Solutions

A person of ordinary skill in the art would be motivated to combine Levin 247 with Kapoor for many reasons. For example, Levin 247 describes communication technologies involving multicarrier modulation, including “reallocating data between carriers.” *E.g.*, Levin 247 at 1:14-17, 2:22-51, 8:1-9. A person having ordinary skill in the art would have been motivated to modify Levin 247 to implement details of Kapoor, including accounting for different carrier characteristics taught by Kapoor because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Kapoor at 4:24-55. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as how it “eliminates the need for the communication device to conduct complex and time consuming calculations.” *E.g.*, Kapoor at Abstract, 1:7-15. In addition, a person of ordinary skill in the art would be motivated to combine Levin 247 with Kapoor because (a) Levin 247 and Kapoor disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Kapoor with those of Levin 247. For similar reasons, a person of ordinary skill in the art would be motivated to combine Levin 247 with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Levin 247 with Kao for many reasons. For example, Levin 247 describes communication technologies involving multicarrier modulation, including “reallocating data between carriers.” *E.g.*, Levin 247 at 1:14-17, 2:22-51, 8:1-9. A person having ordinary skill in the art would have been motivated to modify

Levin 247 to implement the details of adaptable bit and energy configurations of sub-channels taught by Kao because it is also directed at communication technologies involving improving multicarrier modulation. *E.g.*, Kao at Abstract, 1:29-35, 6:9-19. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for improved data throughput, bit error rate, and power margin performance as well as. *E.g.*, Kao at *id.* In addition, a person of ordinary skill in the art would be motivated to combine Levin 247 with Kao because (a) Levin 247 and Kao disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Kao with those of Levin 247. For similar reasons, a person of ordinary skill in the art would be motivated to combine Levin 247 with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Levin 247 with Cai for many reasons. For example, Levin 247 describes communication technologies involving multicarrier modulation, including “reallocating data between carriers.” *E.g.*, Levin 247 at 1:14-17, 2:22-51, 8:1-9. A person having ordinary skill in the art would have been motivated to modify Levin 247 to implement the details of “optimization of the signal-to-noise ratio margin of DMT channels” taught by Cai because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Cai at 1:13-16, 1:65-2:21. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for “determining a variation in a signal-to-noise ratio for each of the channels, and, determining a bit loading

configuration for each of the channels based on the [] variation.” *E.g.*, Cai at 2:16-21. In addition, a person of ordinary skill in the art would be motivated to combine Levin 247 with Cai because (a) Levin 247 and Cai disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Cai with those of Levin 247. For similar reasons, a person of ordinary skill in the art would be motivated to combine Levin 247 with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Levin 247 with Peeters for many reasons. For example, Levin 247 describes communication technologies involving multicarrier modulation, including “reallocating data between carriers.” *E.g.*, Levin 247 at 1:14-17, 2:22-51, 8:1-9. A person having ordinary skill in the art would have been motivated to modify Levin 247 to implement the details of “data element allocation and transmission for each type of data” such that each is “tuned to its own specification” as taught by Peeters because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Peeters at 2:26-28. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for tuning each type of data to its own specifications. *E.g.*, *id.* In addition, a person of ordinary skill in the art would be motivated to combine Levin 247 with Peeters because (a) Levin 247 and Peeters disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in

communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Peeters with those of Levin 247. For similar reasons, a person of ordinary skill in the art would be motivated to combine Levin 247 with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Levin 247 with Jones 909 for many reasons. For example, Levin 247 describes communication technologies involving multicarrier modulation, including “reallocating data between carriers.” *E.g.*, Levin 247 at 1:14-17, 2:22-51, 8:1-9. A person having ordinary skill in the art would have been motivated to modify Levin 247 to implement the details of enhancing the bit rate and margin as well as varying stop and stop frequencies taught by Jones 909 because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Jones 909 at 3:66-4:18, 4:25-35. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for regarding achieving an “enhanced bit rate and/or noise margin.” *E.g.*, Jones 909 at 7:20-40. In addition, a person of ordinary skill in the art would be motivated to combine Levin 247 with Jones 909 because (a) Levin 247 and Jones 909 disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Jones 909 with those of Levin 247. For similar reasons, a person of ordinary skill in the art would be motivated to combine Levin 247 with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

(6) Exemplary Jones 909 Solutions

A person of ordinary skill in the art would be motivated to combine Jones 909 with Kapoor for many reasons. For example, Jones 909 describes communication technologies involving multicarrier modulation, including enhancing the bit rate and margin as well as varying stop and stop frequencies. *E.g.*, Jones 909 at 3:66-4:18, 4:25-35. A person having ordinary skill in the art would have been motivated to modify the Jones 909 to implement details of Kapoor, including accounting for different carrier characteristics taught by Kapoor because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Kapoor at 4:24-55. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as how it “eliminates the need for the communication device to conduct complex and time consuming calculations.” *E.g.*, Kapoor at Abstract, 1:7-15. In addition, a person of ordinary skill in the art would be motivated to combine Jones 909 with Kapoor because (a) Jones 909 and Kapoor disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Kapoor with those of Jones 909. For similar reasons, a person of ordinary skill in the art would be motivated to combine Jones 909 with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Jones 909 with Kao for many reasons. For example, Jones 909 describes communication technologies involving multicarrier modulation, including enhancing the bit rate and margin as well as varying stop and

stop frequencies. *E.g.*, Jones 909 at 3:66-4:18, 4:25-35. A person having ordinary skill in the art would have been motivated to modify the Jones 909 to implement the details of adaptable bit and energy configurations of sub-channels taught by Kao because it is also directed at communication technologies involving improving multicarrier modulation. *E.g.*, Kao at Abstract, 1:29-35, 6:9-19. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for improved data throughput, bit error rate, and power margin performance as well as. *E.g.*, Kao at *id.* In addition, a person of ordinary skill in the art would be motivated to combine Jones 909 with Kao because (a) Jones 909 and Kao disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Kao with those of Jones 909. For similar reasons, a person of ordinary skill in the art would be motivated to combine Jones 909 with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Jones 909 with Cai for many reasons. For example, Jones 909 describes communication technologies involving multicarrier modulation, including enhancing the bit rate and margin as well as varying stop and stop frequencies. *E.g.*, Jones 909 at 3:66-4:18, 4:25-35. A person having ordinary skill in the art would have been motivated to modify the Jones 909 to implement the details of “optimization of the signal-to-noise ratio margin of DMT channels” taught by Cai because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Cai at 1:13-16, 1:65-2:21. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such

as the methods for “determining a variation in a signal-to-noise ratio for each of the channels, and, determining a bit loading configuration for each of the channels based on the [] variation.” *E.g.*, Cai at 2:16-21. In addition, a person of ordinary skill in the art would be motivated to combine Jones 909 with Cai because (a) Jones 909 and Cai disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Cai with those of Jones 909. For similar reasons, a person of ordinary skill in the art would be motivated to combine Jones 909 with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Jones 909 with Peeters for many reasons. For example, Jones 909 describes communication technologies involving multicarrier modulation, including enhancing the bit rate and margin as well as varying stop and stop frequencies. *E.g.*, Jones 909 at 3:66-4:18, 4:25-35. A person having ordinary skill in the art would have been motivated to modify the Jones 909 to implement the details of “data element allocation and transmission for each type of data” such that each is “tuned to its own specification” as taught by Peeters because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Peeters at 2:26-28. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for tuning each type of data to its own specifications. *E.g.*, *id.* In addition, a person of ordinary skill in the art would be motivated to combine Jones 909 with Peeters because (a) Jones 909 and Peeters disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use

of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Peeters with those of Jones 909. For similar reasons, a person of ordinary skill in the art would be motivated to combine Jones 909 with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

A person of ordinary skill in the art would be motivated to combine Jones 909 with Levin 247 for many reasons. For example, Jones 909 describes communication technologies involving multicarrier modulation, including enhancing the bit rate and margin as well as varying stop and stop frequencies. *E.g.*, Jones 909 at 3:66-4:18, 4:25-35. A person having ordinary skill in the art would have been motivated to modify the Jones 909 to implement the details of “reallocating data between carriers” taught by Levin 247 because it is also directed at communication technologies involving multicarrier modulation. *E.g.*, Levin 247 at 1:14-17. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the methods for “an efficient method of performing swapping,” including provisions for error correction techniques, in a multicarrier modulation. *E.g.*, Levin 247 at 1:14-17, 2:22-51, 8:1-9. In addition, a person of ordinary skill in the art would be motivated to combine Jones 909 with Levin 247 because (a) Jones 909 and Levin 247 disclose similar products, such as multicarrier modems, including DSL modems as well as including improved use of such modems and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the teachings of Levin 247 with those of

Jones 909. For similar reasons, a person of ordinary skill in the art would be motivated to combine Jones 909 with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

(7) Exemplary Obviousness Reference Solutions

A person of ordinary skill in the art would be motivated to combine Kapoor, Kao, Cai, Peeters, Levin 247, and Jones 909 (the “Primary References”) with the Secondary References for many reasons. As described above, each of the primary references teach a communication technology involving multicarrier modulation. *See* Sections VIII.B.3.c).(1)-(6). A person having ordinary skill in the art would have been motivated to modify the method of the Primary References to implement the details of the Secondary References because they are also directed to communication technologies involving multicarrier modulation. For example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of an improved transmitter and receiver that support multiple bit allocations that rapidly alter bit allocations to address degraded signals. *E.g.*, Chow at 3:4-13, 4:19-33, 4:36-5:7. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of an improved digital subscriber line communication system that efficiently handles data communications despite random interruptions. *E.g.*, Gross at 2:59-3:49. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of a bit allocation method with more efficient processing for shorter processing times. *E.g.*, Van Kerckhove at 4:43-50. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of updating bit allocations based on varying signal-to-noise ratios of carriers. *E.g.*, Hunt at 1:52-60. As another example, a person of ordinary skill in the art would be motivated by the

advantages of such functionality, such as the use of an improved equalization of margins and bit error rates during initialization and maintenance of bit error rates during transmission. *E.g.*, Levin 633 at 1:61-2:18. As another example, a person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the use of an improved method of establishing communication between line-side and subscriber side units, including improved selection of symbol rate and modulation density. *E.g.*, Eslinger at 1:66-3:50. As another example, a person of ordinary skill in the art would be motivated to include the functionality of admitted prior art disclosed by the Family 10 Patents to increase immunity to various types of noise. '988 Patent at 1:30-2:41; '354 Patent at 1:33-2:45. In addition, a person of ordinary skill in the art would be motivated to combine any Primary Reference with any Secondary reference because (a) each reference discloses similar products, such as multicarrier modems, including DSL modems, and (b) the references are analogous art and in the same field of endeavor as each other, for example, both relate to improvements in communication technologies involving multicarrier modulation. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the Secondary References' teachings with those of the Primary References. For similar reasons, a person of ordinary skill in the art would be motivated to combine the Primary References with other references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 with similar teachings.

d) The Claims Recite Well-Known Concepts That Would Have Been Obvious to Implement.

The Asserted Claims represent nothing more than an arrangement of well-known concepts and features and add nothing to the state of the art at the time of the alleged invention. For each of the concepts represented by the Asserted Claims, it would have been obvious to add to the teachings of any number of known products and references, including to the teachings of any of

the primary references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 to the extent that such reference is alleged to be missing such concept or feature. The following are examples of concepts that would have been obvious, which is not intended to be an exhaustive list of the claimed features that would have been obvious. Nokia Defendants reserve the right to supplement these examples as necessary.

(1) It would have been obvious to modify any primary reference to include “a multicarrier communications transceiver operable to demodulate for reception a first plurality of bits from a first carrier using a first Signal to Noise Ratio (SNR) margin and to demodulate for reception a second plurality of bits from a second carrier using a second SNR margin, and to demodulate for reception a third plurality of bits from the first carrier using a third SNR margin, wherein the first SNR margin specifies a first value for an allowable increase in noise without an increase in the bit error rate (BER) associated with the first carrier” in any configuration (’988 Patent, Claim 16).

To the extent TQ Delta contends that any reference charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 does not disclose the limitation recited above it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354. A person having ordinary skill in the art would have been motivated to employ or implement that feature. *See* ’988 Patent at 1:54-2:36 (describing admitted prior art). A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See id.* at 1:41-53 (describing advantages of multicarrier modulation of the admitted prior art). Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(2) It would have been obvious to modify any primary reference for “the second SNR margin specifies a second value for

an allowable increase in noise without an increase in the bit error rate (BER) associated with the second carrier” (’988 Patent, Claim 16).

To the extent TQ Delta contends that any reference charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 does not disclose the limitation recited above it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354. A person having ordinary skill in the art would have been motivated to employ or implement that feature. *See* ’988 Patent at 1:54-2:36 (describing admitted prior art). A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See id.* at 1:41-53 (describing advantages of multicarrier modulation of the admitted prior art). Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(3) It would have been obvious to modify any primary reference for “the third SNR margin specifies a third value for an allowable increase in noise without an increase in the bit error rate (BER) associated with said first carrier” (’988 Patent, Claim 16).

To the extent TQ Delta contends that any reference charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 does not disclose the limitation recited above it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354. A person having ordinary skill in the art would have been motivated to employ or implement that feature. *See* ’988 Patent at 1:54-2:36 (describing admitted prior art). A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See id.* at 1:41-53 (describing advantages of

multicarrier modulation of the admitted prior art). Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(4) It would have been obvious to modify any primary reference for “the first plurality of bits, the second plurality of bits and the third plurality of bits are each different from one another” (’988 Patent, Claim 16).

To the extent TQ Delta contends that any reference charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 does not disclose the limitation recited above it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354. A person having ordinary skill in the art would have been motivated to employ or implement that feature. *See* ’988 Patent at 1:54-2:36 (describing admitted prior art). A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See id.* at 1:41-53 (describing advantages of multicarrier modulation of the admitted prior art). Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(5) It would have been obvious to modify any primary reference for “the apparatus is a customer premises equipment that is capable of transporting internet data” (’988 Patent, Claim 22).

To the extent TQ Delta contends that any reference charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 does not disclose the limitation recited above it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354. A person having ordinary skill in the art would have been

motivated to employ or implement that feature. *See* '988 Patent at 1:41-2:36 (describing admitted prior art, including G.992.1, G.992.2, and T1.413); G992.1 at Appendix III (describing “[c]ompatibility with other customer premises equipment”). A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See id.* at 1:41-53 (describing advantages of multicarrier modulation of the admitted prior art). Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(6) It would have been obvious to modify any primary reference to include “a multicarrier communications transceiver operable to” in any configuration ('354 Patent, Claim 10).

To the extent TQ Delta contends that any reference charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 does not disclose the limitation recited above it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354. A person having ordinary skill in the art would have been motivated to employ or implement that feature. *See* '354 Patent at 1:56-2:40 (describing admitted prior art). A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See id.* at 1:44-56 (describing advantages of multicarrier modulation of the admitted prior art). Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(7) It would have been obvious to modify any primary reference to “receive a multicarrier symbol comprising a first

plurality of carriers and a second plurality of carriers” (’354 Patent, Claim 10).

To the extent TQ Delta contends that any reference charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 does not disclose this limitation it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354. A person having ordinary skill in the art would have been motivated to employ or implement that feature. *See* ’354 Patent at 1:56-2:40 (describing admitted prior art). A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See id.* at 1:44-56 (describing advantages of multicarrier modulation of the admitted prior art). Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(8) It would have been obvious to modify any primary reference to “receive a first plurality of bits on the first plurality of carriers using a first SNR margin” (’354 Patent, Claim 10).

To the extent TQ Delta contends that any reference charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 does not disclose this limitation it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354. A person having ordinary skill in the art would have been motivated to employ or implement that feature. *See* ’354 Patent at 1:56-2:40 (describing admitted prior art). A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See id.* at 1:44-56 (describing advantages of multicarrier modulation of the admitted prior art). Little or no complexity would have been

involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(9) It would have been obvious to modify any primary reference to “receive a second plurality of bits on the second plurality of carriers using a second SNR margin” (’354 Patent, Claim 10).

To the extent TQ Delta contends that any reference charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 does not disclose this limitation it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354. A person having ordinary skill in the art would have been motivated to employ or implement that feature. *See* ’354 Patent at 1:56-2:40 (describing admitted prior art). A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See id.* at 1:44-56 (describing advantages of multicarrier modulation of the admitted prior art). Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(10) It would have been obvious to modify any primary reference for “the first plurality of carriers is different than the second plurality of carriers” (’354 Patent, Claim 10).

To the extent TQ Delta contends that any reference charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 does not disclose this limitation it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354. A person having ordinary skill in the art would have been motivated to employ or implement that feature. *See* ’354 Patent at 1:56-2:40 (describing admitted prior art). A

person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See id.* at 1:44-56 (describing advantages of multicarrier modulation of the admitted prior art). Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(11) It would have been obvious to modify any primary reference for “the first SNR margin specifies a first value for an increase in noise associated with the first plurality of carrier” (’354 Patent, Claim 11).

To the extent TQ Delta contends that any reference charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 does not disclose this limitation it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354. A person having ordinary skill in the art would have been motivated to employ or implement that feature. *See* ’354 Patent at 1:56-2:40 (describing admitted prior art). A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. *See id.* at 1:44-56 (describing advantages of multicarrier modulation of the admitted prior art). Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(12) It would have been obvious to modify any primary reference for “the second SNR margin specifies a second value for an increase in noise associated with the second plurality of carriers” (’354 Patent, Claim 12).

To the extent TQ Delta contends that any reference charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 does not disclose this

limitation it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354. A person having ordinary skill in the art would have been motivated to employ or implement that feature. See '354 Patent at 1:56-2:40 (describing admitted prior art). A person of ordinary skill in the art would have additionally been motivated, at the time of the invention, to employ or implement that feature. See *id.* at 1:44-56 (describing advantages of multicarrier modulation of the admitted prior art). Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

e) Additional Reasons to Combine.

In addition to the information contained elsewhere in these invalidity contentions, including in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354, Nokia Defendants have identified additional motivations and reasons to combine the various references. Nokia Defendants note that in *KSR Int'l Co. v. Teleflex Inc.*, the Supreme Court held that “[i]n determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. What matters is the objective reach of the claim. If the claim extends to what is obvious, it is invalid under § 103.” 127 S. Ct. 1727, 1742 (2007).

KSR further illustrated several ways in which the subject matter of a patent claim may be shown to have been obvious. For instance, “[o]ne of the ways in which a patent’s subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent’s claims.” *KSR*, 127 S. Ct. at 1742. The Supreme Court held that it was error to “look only to the problem the patentee was trying to

solve.” *Id.* As the Court explained, “[t]he question is not whether the combination was obvious to the patentee but whether the combination was obvious to a person with ordinary skill in the art. Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *Id.* Further, “[c]ommon sense teaches ... that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle.” *Id.* Further, a showing that a combination of elements was “obvious to try” may demonstrate that it was obvious under § 103. *Id.* For instance, the Supreme Court held that “predictable solutions” using a combination of “known options” may render the subject matter of a patent claim obvious. *Id.*

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product was not of innovation but of ordinary skill and common sense. *Id.* The ways in which the subject matter of a patent claim may be shown to be obvious, identified by *KSR*, are merely illustrative. A core thrust of *KSR* was that “[r]igid preventative rules that deny factfinders recourse to common sense are neither necessary under our case law nor consistent with it.” *KSR*, 127 S. Ct. at 1742-43 (quoting *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1367 (Fed. Cir. 2006) (“Our suggestion test is in actuality quite flexible and not only permits, but requires, consideration of common knowledge and common sense”), and *Alza Corp. v. Mylan Labs., Inc.*, 464 F.3d 1286, 1291 (Fed. Cir. 2006) (“There is flexibility in our obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires an actual teaching to combine ...”).

Although Nokia Defendants note that there is no longer a rigid requirement regarding motivation to combine under *KSR*, Nokia Defendants provide the following statements regarding motivation to combine. Multiple teachings, suggestions, and/or reasons to modify any of the references and/or to combine any two or more of the references in Exhibits F10-988A – F10-988F, F10-354A – F10-354F and F10 Secondary-988, F10 Secondary-354 come from many sources, including the prior art (specific and as a whole), common knowledge, common sense, predictability, expectations, industry trends, design incentives or need, market demands or pressure, market forces, obvious to try, the nature of the problem faced, and/or knowledge possessed by one of ordinary skill. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one.

The combination of prior art references identified in these contentions would have been obvious because the combination represents the known potential options with a reasonable expectation of success. Additionally, one of ordinary skill in the art would have been motivated to create combinations identified in these contentions using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or teaching, suggestion, or motivation in the prior art generally. Also, market forces in the industry, and the desire to improve features and performance, would motivate the addition of features to systems as they became available, became less expensive, became more commonly used, provided better performance, reduced costs, size or weight, or predictably achieved other desirable results.

C. Other Grounds for Invalidity

Nokia Defendants identify the following additional grounds for invalidity of the Asserted Claims of the Family 10 Patents. Nokia Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

In addition to the preceding invalidity contentions, Nokia Defendants reserve the right to assert that the Asserted Claims are invalid under 35 U.S.C. § 102(f) and/or § 102(g) in the event that Nokia Defendants obtain evidence that the named inventor of the Family 10 Patents did not invent (either alone or in conjunction with other parties) the subject matter claimed in the Family 10 Patents. Should Nokia Defendants obtain such evidence, Nokia Defendants will provide the name of the person(s) from whom and the circumstances under which the invention or any part of it was derived, and/or the circumstances surrounding the making of the invention before the patent application.

Nokia Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

DOCUMENT PRODUCTION

Based on investigations to date and their understanding of TQ Delta's Infringement Contentions, Nokia Defendants are producing documents labeled NOK0000001 – NOK084566. This production includes (1) prior art referenced in the invalidity contentions and (2) technical documents sufficient to show the operation of the accused product(s). Many of these documents are marked "RESTRICTED – ATTORNEYS' EYES ONLY," and should be treated accordingly.

Discovery and Nokia Defendants' investigation are ongoing in this case, and Nokia Defendants reserve the right to identify and produce additional documents pursuant to the Local Rules and applicable Orders of the Court.

Dated: January 13, 2022

Respectfully submitted,

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CERTIFICATE OF SERVICE

Pursuant to Local Rule CV-5(c), the undersigned certifies that a true and correct copy of the foregoing document was served upon counsel for record via email on January 13, 2022.

/s/ M. Scott Stevens
M. Scott Stevens