IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF CALIFORNIA
SAN JOSE DIVISION

ADAPTIX, INC. Plaintiff v. APPLE, INC. *et al.* Defendants	Case No. 5:13-cv-01776-PSG
ADAPTIX, INC. Plaintiff v. APPLE, INC. *et al.* Defendants	Case No. 5:13-cv-01777-PSG
ADAPTIX, INC. Plaintiff v. AT&T MOBILITY LLC *et al.* Defendants	Case No. 5:13-cv-01778-PSG
ADAPTIX, INC. Plaintiff v. CELLCO PARTNERSHIP *d/b/a* VERIZON WIRELESS *et al.* Defendants	Case No. 5:13-cv-01844-PSG
ADAPTIX, INC. Plaintiff v. APPLE, INC. *et al.* Defendants	Case No. 5:13-cv-02023-PSG

EXPERT REPORT OF MICHAEL CALOYANNIDES, Ph.D., CONCERNING REBUTTAL TO EXPERT REPORT OF THOMAS FUJA, Ph.D. REGARDING VALIDITY OF U.S. PATENT NOS. 6,947,748 AND 7,454,212

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CONFIDENTIAL—OUTSIDE COUNSEL ONLY

I. INTRODUCTION

I, Michael Caloyannides, submit this expert report to state my opinion on the matters described below.

1. I have been retained by the plaintiffs in this action, Adaptix, Inc. (collectively "Adaptix") to review certain representative prior art and other materials relating to U.S. Patent Nos. 7.454,212 ("the '212 patent") and U.S. Patent 6,947,748 ("the '748 patent) (collectively "asserted patents"), and to give an opinion as to the validity of these patents. This report sets forth the opinions I have formed in this case based on my study of the evidence, my understanding as an expert in the field, and my education, training, research, knowledge, and personal and professional experience.

2. I am being compensated for my time at my usual rate of $350 for each hour of service that I provide in connection with this case, including time I spend consulting, writing this report, giving deposition testimony and testifying at trial. This compensation is in no way contingent upon my performance or the outcome of this case.

A. Qualifications and Prior Testimony

3. *See* this section of my prior reports in these actions.

B. Materials Considered

4. In performing my analysis and reaching the opinions I express in this matter, I have reviewed the asserted patents, the prosecution histories of the asserted patents, the Court's claim constructions of terms contained in the asserted claims of the asserted patents, and the various prior art references. The list of materials I

have considered or relied upon in the course of forming my opinions is attached as Exhibit A. However, I am continuing to review documents and filings in this action.

5. I understand that additional information may be provided after this report is submitted that could be relevant to my opinions. Therefore, I may need to supplement my report as additional material and information becomes available.

C. SUMMARY OF OPINIONS

6. As stated in my earlier report, I expect to testify about background issues necessary to understand the technology at issue, including an explanation of navigation and cellular technology in general and 4G/LTE in particular. Such testimony may include addressing the historical context of this technology, including how the patented invention solved problems encountered in the industry at the time of the invention. I may also testify regarding the development of cellular telephony over time, and how cellular networks and handsets that involve those technologies function. If asked, I may also testify about the interpretation of disputed claim terms.

7. I have been asked to opine on issues related to the validity of the ‘212 and ‘748 patents.

8. I have read the written description, claims, and all relevant portions of the prosecution history of these patents.

9. In my opinion, the asserted claims of these patents are valid. The arguments put forth by the defendants’ expert, Thomas Fuja, Ph.D., alleging invalidity of either of these patents are incorrect for the reasons I detail below. To maintain

consistent paragraph numbers, this report will rebut Fuja's report in both the Texas and California cases, even though the claims Fuja covered varied between his reports.

10. These patents teach how to enable high speed data communications for cellular telephones. The need for high speed data communications for cellular telephones had been a long-felt unmet need almost since the popularization of cellular telephony; up until the inventions of the two asserted patents, there had been no effective means for such communications because of seemingly insurmountable technical problems caused by multipath in terrestrial mobile environments. The asserted patents provided the solution to this technical problem by using complementary elements that enabled such communications. The Fuja report ignores that the inventions of the asserted patents were a combination of elements applied together in the right manner to facilitate high speed data communications in a mobile environment. Prior to the inventions of the asserted patents, individual elements of those patents had been considered by globally empowered bodies, such as the 3GPP, but in isolation, and had been rejected because each, by itself, did not solve the problem.

D. Claim Construction

11. Where the Court has previously construed terms, I have based my opinions upon the Court's construction. As for any terms not construed in the present litigation, I have given those terms their plain and ordinary meaning, as understood by a person of skill in the art at the time of the filing of the '212 and '748 patents.

Claim Term	EDTX Construction	NDCA Construction
"SINR" ('748 Patent, claims 6, 8, 19, & 21; '212 Patent, claim 19)	"Signal-to-Interference-plus-Noise Ratio" (stipulated construction)	"Signal-to-Interference-plus-Noise Ratio" (stipulated construction)

Claim Term	EDTX Construction	NDCA Construction
"pilot symbols" ('748 Patent, claims 6, 8, 19, & 21; '212 Patent, claims 1 & 18)	"symbols, sequences, or signals known to both base station and subscriber" (stipulated construction)	"symbols, sequences, or signals known to both base station and subscriber" (stipulated construction)
"clusters of subcarriers" ('748 Patent, claims 6, 11, 19, & 21; '212 Patent, claims 13 & 18)	"at least two logical units of subcarriers" (stipulated construction)	"at least two logical units of subcarriers" (stipulated construction)
"selecting" ('748 Patent, claim 6 & 8; '212 Patent, claim 1)	"choosing" (stipulated construction)	"choosing" (stipulated construction)
"intra-cell traffic load balancing" ('748 Patent, claim 11)	"balancing cluster usage within a cell of a base station" (stipulated construction)	"balancing cluster usage within a cell of a base station"
"select[ing] a set of candidate subcarriers" ('748 Patent, claims 6, 8, 19 & 21; '212 Patent, claims 1 & 18)	"choos[ing] a set of subcarriers that the subscriber requests for use"	"Selecting" = "Choosing." All other terms: plain and ordinary meaning

Claim Term	EDTX Construction	NDCA Construction
"subcarriers [of/from] the set of subcarriers selected by the [first] base station" ('748 Patent, claims 6, 8, 19 & 21; '212 Patent, claims 1 & 18)	"subcarriers that the base station has chosen from the set of candidate subcarriers selected by the subscriber"	"Subcarriers that the base station has chosen from the set of candidate subcarriers selected by the subscriber"
"index indication of a candidate cluster with it[s] SINR value" ('748 Patent, claims 6 & 19)	"identifier (ID) of a chosen candidate cluster of subcarriers accompanied by its SINR value"	"Identifier (ID) of a chosen candidate cluster of subcarriers with its SINR value."
"SINR value" ('748 Patent, claims 6 and 19)	"Signal-to-Interference-plus-Noise Ratio measurement"	"Calculation based on the Signal-to-Interference-plus-Noise Ratios of the cluster's subcarriers"
"a system employing orthogonal frequency division multiple access (OFDMA)" ('748 Patent, claims 6 and 8; '212 Patent, claim 1)	Plain and ordinary meaning	"OFDMA": orthogonal frequency division multiple access All other terms: plain and ordinary meaning
"subcarrier allocation for OFDMA" ('748 Patent, claim 11)	Plain and ordinary meaning	"OFDMA": orthogonal frequency division multiple access All other terms: plain and ordinary meaning
"OFDMA subcarriers" ('748 Patent, claims 11, 19, and 21; '212 Patent, claim 18)	Plain and ordinary meaning	"OFDMA": orthogonal frequency division multiple access; All other terms: plain and ordinary meaning

Claim Term	EDTX Construction	NDCA Construction
"arbitrarily ordering" ('748 Patent, claims 6 & 19; '212 Patent, claims 13 & 28)	"order[ed/ing] in an order not known by the base station"	"Order[ed/ing] in a manner not previously defined"

E. LEGAL STANDARDS

1. General Matters

12. In forming and expressing my opinions and in considering the subject matter of the asserted patents and their claims in light of the prior art, I am relying on certain legal principles that counsel in this case explained to me. My understanding of these concepts is summarized below:

13. The claims define the invention. An invalidity analysis is a two-step process. First, the claims of the patent are construed to resolve any disputes as to their meaning and scope. Second, after the claims are construed, the content of the prior art is compared to the construed claims.

2. Person of Ordinary Skill in the Art

14. Infringement must be analyzed from the perspective of "one of ordinary skill in the art" involved in the same field as the patents-in-suit at the time of the invention. It is my opinion that a person of ordinary skill in the art in the field of the asserted patents would have had an undergraduate degree in electrical engineering, physics or equivalent and a minimum of five years of professional experience in the field of mobile wireless telecommunications. Alternatively, that person would have a master's degree in the same subjects and a minimum of two years of professional experience in the field of mobile wireless

telecommunications. Additionally, that person would have experience in the design of mobile wireless cellular equipment and the standards that govern such equipment.

15. As of the filing date of the application for the '748 patent and the '212 patent, I was at least a person of ordinary skill in the art.

3. Validity

16. A patent is valid if the invention claimed in the patent is new, useful, and non-obvious in light of the "prior art." That is, the invention as defined by the claims of the patent must not be anticipated by or rendered obvious by the prior art. Additionally, patent claims must meet other requirements I set forth below.

4. Prior Art

17. Prior art is generally the state of technology in the relevant field at the time of the invention and includes such documentary materials as patents and publications, as well as evidence of actual uses or sales of a technology within the United States. That categories of prior art include: (1) anything that was publicly known or used in the United States by someone other than the inventor before the inventor made his invention; (2) anything that was in public use or on sale in the United States more than one year before the application for the patent was filed by the inventor; (3) anything that was patented or described in a printed publication anywhere in the world before the inventor made his invention; (4) anything that was patented or described in a printed publication anywhere in the world more than one year before the inventor filed the application for the patent; (5) anything that was invented by another person in this country before the inventor made his invention

so long as the other person did not abandon, suppress, or conceal his prior invention; and (6) anything that was described in a patent that issued from or a publication of a patent application filed in the United States or in certain foreign countries before the inventor made his invention**.**

18. Although I have assumed, for purposes of my report, that everything Fuja relies upon is prior art, I understand that Adaptix disputes the prior art status of some of the items in his report.

5. Anticipation: 35 U.S.C. §102

20. Patent claims are presumed valid, and can be determined to be invalid only if such is proven by clear and convincing evidence.

21. A patent claim is anticipated by prior art and thus invalid only when a single piece of prior art meets or discloses all of the limitations of the claim and when such prior art enables one of ordinary skill in the art to make and use the claimed invention without undue experimentation. The determination of whether a claim limitation is met or disclosed is a two-step analysis: (1) determining the meaning and scope of the claims, and (2) comparing the properly construed claims to the prior art. The first step is commonly known as claim construction. Claim construction is a matter of law. Anticipation requires that each element of the claimed invention must be found either expressly or inherently in a single prior art reference or that the claimed invention was previously known or embodied in a single prior art device or practice.

6. Obviousness: 35 U.S.C. §103

22. A claim is obvious in light of the prior art if the differences between the claimed subject matter and the prior art are such that the subject matter as a whole would have been obvious, at the time the invention was made, to a person having ordinary skill in the art. In conjunction with interpretation of the claims themselves, the following four factors are used to guide the determination of whether a patented invention is obvious: (1) the scope and content of the prior art; (2) the differences between the prior art and the claimed invention; (3) the level of skill of a person of ordinary skill in the art; and (4) any objective indicia of non-obviousness. The objective indicia that may bear on the question of obviousness or non-obviousness include whether the claimed invention proceeded in a direction contrary to the accepted wisdom in the field, whether there was a long felt but unresolved need in the field that was satisfied by the claimed invention, whether others had tried but failed to make the claimed invention, whether others copied the claimed invention, whether the claimed invention achieved any unexpected results, whether the claimed invention was praised by others, whether others have taken licenses to use the claimed invention, whether experts or those skilled in the field of the claimed invention expressed surprise or disbelief regarding the claimed invention, and whether products incorporating the claimed invention have achieved commercial success. Where the patent challenger contends that a person of ordinary skill in the art would combine various aspects of the prior art to arrive at the claimed invention, the burden falls on the challenger to show by clear and convincing evidence that a person of ordinary skill in the art would have been motivated to combine the teachings of the prior

art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.

7. Written Description, Enablement, Definiteness: 35 USC §§ 112(1) and (2)

23. The specification of a patent must contain a written description of the invention. One purpose of the written description requirement is to convey to a person of ordinary skill in the art that the inventor was in possession of the invention claimed in the inventor's patent.

24. A patent must also include a written description that teaches those of ordinary skill in the art at the time the patent application was filed how to make and use the full scope of the claimed invention without undue experimentation. The specification must contain an enabling description of any best mode an inventor recognized at the time of filing for practicing the claimed invention. The patent specification must "contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to ***enable*** any person skilled in the art . . . to make and use the same." 35 U.S.C. § 112, ¶ 1 (emphasis added).

II. SUMMARY OF OPINIONS

25. This report describes testimony that I may present regarding the technical subject matter described in the '212 and '748 patents, as well as what was known in the art at the priority date of the '212 and '748 patents.

26. I expect to testify regarding the state of the art at the relevant time; the background; and content of all of the prior art references discussed in this report,

and their significance in the context of the state of the relevant art at the priority date of the asserted patents.

27. I reserve the right to respond, either through a supplemental report or at trial, to any expert reports, testimony, or evidence that may be produced.

28. My opinion is that each of the asserted claims of the asserted patents is valid in view of the prior art references discussed in the Fuja report, either independently or in combination with other references, with the general knowledge of one of ordinary skill in the art at the relevant date of invention.

A. U.S. PATENT NO. 7,454,212 and U.S. PATENT NO. 6,947,748

29. The ‘212 patent relates to an OFDMA system, where the subscriber unit selects a set of candidate subcarriers and provides feedback information on the set of candidate subcarriers so that the base station can make an allocation decision based on that feedback. Both the feedback and allocation are updated. See, e.g., claims 1 and 18. Providing feedback on the set addresses the frequency selective nature of the wireless channel by providing feedback on a per frequency basis. Updating the feedback addresses the time varying nature of the wireless channel (i.e. frequency specific channel conditions change in time – e.g.. when a user moves).

30. The ’748 patent also relates to an OFDMA system, where the subscriber unit selects a set of candidate subcarriers and provides feedback information on the set of candidate subcarriers so that the base station can make an allocation decision based on that feedback. The subscriber sends to the base station an indication of coding and modulation rates that the subscriber desires to employ. See, e.g.,

claims 8 and 21. By the subscriber providing an indication of coding and modulation rates that the subscriber desires to employ, the system addresses the varying degree to which channel conditions can change (i.e., not simply that the subcarriers re good or bad, but how good or how bad). The degree of the channel condition dictates how much information can be passed on a given frequency at a given time (modulation / code set). The Fuja Report alleges that a number of claims of the '748 and '212 patents are invalid.

31. Fuja argues that the asserted claims of the '748 and '212 patents are anticipated by or obvious in light of various references. He is wrong, for a number of reasons, beginning with whether certain of the cited references disclose particular limitations or even relate to the types of systems or contexts Dr. Fuja contends.

B. PRELIMINARY OBSERVATIONS

32. Attacks on the validity of the asserted patents miss a key point: the asserted patents do not purport to have invented any one of the various individual technologies they use, just like patents on avionics for aircraft do not purport to have invented the transistor, antennas, the airplane, or any one technology they use. As such, invalidity attacks that amount to stating that individual technologies (such as the transistor in the case of avionics, or OFDMA in the case the asserted patents) predated those patents are misguided and miss the point. The point is that the asserted patents invented a solution to a long felt need that had not been met, that other OFDM based approaches had been considered by the industry for purposes of third generation wireless and summarily dismissed, and that the

solutions invented form the basis for fourth generation wireless and have been extremely successful commercially.

33. The solution provided by the asserted patents is the judicious integrated combination of a number of mutually complementary elements) integrated (such as OFDMA, and use of the entire allocated RF spectrum to a carrier by multiple mobiles in a manner that each mobile uses portions of it in an optimal manner, *and* recurrent reporting by the mobiles to the base station on groups of subcarriers, *and* multiple other elements) in precisely the right manner to solve the problem of high speed mobile data communications.

34. It is for this reason just articulated that the invalidity assertions by Dr. Fuja's report as just as off-base as an attempt to invalidate avionics patents by claiming that the development of the transistor has predated them.

35. The "secondary considerations," such as long felt unmet need, commercial success, etc. are ignored by Dr. Fuja's invalidity report; yet it is precisely those secondary considerations that are extremely important in showing why the asserted patents, which are presumed valid anyway, are indeed valid. Specifically:

a. There was a long felt unmet need for high speed mobile data communications and that need was constantly increasing for decades (and continues to increase), hence the evolution of mobile data from none to CDPD, to EDGE, to 3G technologies, and not to LTE that uses the asserted patents;

b. Even though all the many pieces of the invention of the asserted patents had appeared in some form in isolation in the past in connection with other scenarios and problems, nobody had integrated them together in the manner done by the asserted patents and in each case chose to do the opposite of what the inventors had done; not only that but, when the 3GPP body considered a similar solution to that invented by the asserted patents in the pat, 3GPP unanimously voted it down; and

c. The solution invented by the asserted patents was a huge commercial success as evidenced by the fact that it has been adopted by 4G cellular standards on a global scale.

36. Despite all of the foregoing fundamental considerations, this rebuttal will address the concerns raised by Dr. Fuja's invalidity report, one by one, in the interest of completeness. Even so, the reader should keep the above overarching considerations in mind.

III. OPINIONS

A. '748 Patent [1]

1. Claim 6 of the '748 Patent is not rendered obvious by Ritter in Combination with Hashem '569 or the Sollenberger Article or the IS-95A Standard

37. For the reasons set forth below with respect to claims 8 and 21, claim 6 is not rendered obvious by Ritter in combination with Hashem '569 or the Sollenberger Article or the IS-95A Standard.

2. Claim 6 of the '748 Patent is not rendered obvious by the Sollenberger Publications

38. For the reasons set forth below with respect to claims 8 and 21, claim 6 is not rendered obvious by the Sollenberger Publications.

3. Claim 6 of the '748 Patent is not rendered obvious by Hashem '569 alone or in combination with Ritter

39. For the reasons set forth below with respect to claim 8 and 21, claim 6 is not rendered obvious by Hashem '569 alone or in combination with Ritter.

[1] Throughout this report, unless otherwise noted, my explanations for why one of ordinary skill in the art would not be motivated to combine references and why any such asserted combinations would not have been obvious apply equally throughout the claims analyzed.

4. Claim 7 of the '748 Patent is not rendered obvious by Ritter in Combination with Hashem '569

40. For the reasons set forth below with respect to claims 8 and 9, claim 7 is not rendered obvious by Ritter in combination with Hashem '569.

5. Claim 7 of the '748 Patent is not rendered obvious by the Sollenberger Publications in Combination with Hashem '569

41. For the reasons set forth below with respect to claims 8 and 9, claim 7 is not rendered obvious by the Sollenberger Publications in combination with Hashem '569.

6. Claim 7 of the '748 Patent is not rendered obvious by Hashem '569

42. For the reasons set forth below with respect to claim 9, claim 7 is not rendered obvious by Hashem '569.

7. Claim 7 of the '748 Patent is not rendered obvious by the Project Angel System Alone or in Combination with Hashem '569

43. For the reasons set forth below with respect to claims 8 and 9, claim 7 is not rendered obvious by the Project Angel system alone or in combination with Hashem '569.

8. Claim 8 of the '748 Patent is not Anticipated or Rendered Obvious by Hashem '569

44. The following analysis demonstrates that claim 8 of the '748 Patent is not anticipated or rendered obvious by Hashem '569.

Preamble - "A method for subcarrier selection for a system employing orthogonal frequency division multiple access (OFDMA) comprising."

45. The limitations throughout this claim employ feature of OFDMA. Therefore, this preamble breathes life and meaning into the claim. Hashem '569 does not disclose this element because it does not disclose multiple access. Fuja simply

cross references his discussion of the preamble of claim 6 of the '748 as support for his contention that Hashem '569 discloses a system employing OFDMA. In his discussion of claim 6 of the '748 patent, which is incorporated by reference in his discussion of later claims, Fuja misstates that Hashem '569 "addressed the design of wireless OFDMA cellular systems." Fuja also misrepresents the language of Hashem '569 by citing to a portion of the specification that talks about how many subcarriers an OFDM system can use, and then tacking on to that quoted language an assertion that these could serve multiple remote units at the same time, attributing this proposition to Hashem '569 at 2:8-9. The language added after the quote by Fuja appears nowhere in Hashem '569 and is not supported by the teachings in this portion, or any portion, of its specification or its claims. OFDM can be used to support multiple users without using OFDMA (*e.g.*, OFDM + TDMA). But OFDM, in fact, teaches away from OFDMA, as it is the opposite. Conventional OFDM allocates all the subcarriers to a single subscriber unit, whereas with OFDMA, only some of the subcarriers are allocated to any one of the subscriber units. Therefore, since Hashem does not disclose OFDMA, for that reason alone, claim 8 of the '748 Patent is not anticipated by Hashem '569.

46. Further, the preamble of claim 8 of the '749 is not rendered obvious by Hashem '569. OFDM is very different from OFDMA as taught by the '748 patent. Fuja does not acknowledge this distinction, and simply tacks the multiple-access concept—or the letters "MA" themselves—on to references otherwise limited to OFDM. However, even if one were to assume Hashem taught multiple access,

that does not necessarily equal OFDMA where different frequencies are used by different users at the same time, for OFDM can be used in conjunction with TDMA, where each user uses all frequencies, but at different times and still be multiple access. Hashem '569 clearly teaches away from an OFDMA solution, as evidenced by its focus on ways to use all the subcarriers or subbands in different ways or for different purposes *for the one user*, not for multiple users at the same time. Dr. Fuja exploits the cosmetic resemblance of the two acronyms, OFDM and OFDMA, but the two acronyms stand for very different things, that solve different problems, and that apply to different scenarios. In the case of OFDM, the "M" stands for "multiplexing" and refers to how a wireless frequency band can be split into multiple sub-channels. In OFDMA, the "MA" stands for "multiple access" and refers to a way of using OFDM to support multiple users at the same time.

47. The '748 patent is directed towards OFDMA systems, where subcarriers that are not acceptable for one user can be allocated to a different user for whom they are acceptable in the same scheduling interval, or TTI. '748 Patent at 1:43-53. Hashem '569, on the other hand, says nothing about adaptively allocating subcarriers so that each of multiple subscribers enjoys good channel quality simultaneously. It teaches ways to use all subcarriers for transmission to a single user at a time, even those that are considered unacceptable, such as by transmitting lower priority traffic on them or borrowing their power to use for transmission on the better subcarriers. This shows that Hashem did not appreciate the particular nature of the wireless channel in a multi-user mobile network were

what is bad for one user can be good for another, given their different locations with respect to the base station. Therefore, the knowledge of a person of ordinary skill in the art would not render obvious adding an OFDMA scheme, which Hashem '569 teaches away from, with Hashem '569.

Element 8[e] – "the subscriber receiving an indication of subcarriers of the set of subcarriers selected by the base station for use by the subscriber."

48. Hashem '569 does not disclose the limitations of claim element 8[e] of the '748 Patent. The indication described by Hashem '569 cited by Fuja as disclosing this element is one which informs the handset of "new optimum transmission parameters," not the selected subcarriers for which transmission parameters will be used. One skilled in the art would not understand that the implementation of this transmission-parameter message would be an indication of subcarriers selected by the base station because Hashem '569 does not include an indication of selected subcarriers. This is a further confirmation that Hashem was not thinking about OFDMA. Instead, Hashem's transmission parameters include a modulation level, a coding rate, a symbol rate, a transmission power level, antenna directional parameters, or space-time coding parameters. Hashem '569 at 4:11-15. Because Hashem '569 does not teach multiple users (the MA part of OFDMA that is not mentioned in Hashem '569), a person of ordinary skill in the art would have no motivation to consider the possibility of assigning some subchannels to one user and different subchannels to another user. Fuja alternatively cites to a portion of Hashem '569 (5:20-21) that explains that the new signal only codes the data over the acceptable subcarriers. Fuja does not explain why encoding data only over the acceptable subcarriers discloses an

indication of subcarriers selected by the base station; it does not. Further, two sentences later, Hashem '569 explains that even with this encoding of data only over acceptable subcarriers, the remaining subcarriers can be allocated for certain other uses, and thus selected by the base station for use by the remote unit. Hashem '569 at 5:21-40. That Hashem '569 also proposes another technique, where no indication of even transmission parameters needs to be sent to the subscriber, does not disclose or render obvious an indication of subcarriers selected by the base station. As described above, a message about transmission parameters is not an indication of subcarriers selected by the base station, so this citation does not disclose this claim element. Hashem's system could also be set up such that the subscriber unit knows in advance that it will only receive information, or important information, on those clusters it indicates are good. So it is not inherent that the base station would signal an indication in Hashem's system. Signaling a selection of subcarriers only becomes important in an OFDMA context where a user does not get assigned all of the clusters that are good for it, but rather only a subset thereof, because the base station can be serving many other users simultaneously. Hashem '569 thus does not anticipate or render obvious this claim.

5. Claim 8 of the '748 Patent is not Rendered Obvious by the Work of Ritter in Combination with Hashem '569

49. The following analysis demonstrates that claim 8 of the '748 Patent is not rendered obvious by Ritter in combination with Hashem '569. As a preliminary matter, it would not be obvious to one of ordinary skill in the art to combine Hashem '569 with Ritter, because to do so one would have to ignore explicit

contrary teachings in each reference. For example, one would have to ignore that Ritter describes a system that provides feedback that identifies selected segments, but not how good those segments are. Ritter's system, therefore, cannot vary the information density for each user so as to make most efficient use of the wireless channel in a multi-user mobile wireless network where channel conditions can vary significantly as a function of frequency for each user. On the other hand, as described above, Hashem '569 is not an OFDMA system, and teaches away from an OFDMA approach. Rather than assigning subcarriers (or segments) that are unacceptable for one user to another user for whom they are acceptable, Hashem teaches ways to use the unacceptable subcarriers for transmitting less important information or to not use them and just borrow their transmission power. Thus, Hashem '569 fails to appreciate the benefit of using OFDMA in a multi-user mobile wireless system. Both Ritter and Hashem, themselves, worked for two of the largest players in the industry (Siemens and Nortel, respectively), at around the same time, and each chose a design with limited performance because they were not focused on the same problem that Adaptix was: mobile multi-user wireless.

Element 8[a][2] – "based on pilot symbols received from a base station."

50. Ritter does not disclose measurements based on pilot signals received from a base station, and does not render this claim element obvious. For example, Fuja notes that Ritter proposed a novel measurement technique that specifically avoided the use of known, non-data-bearing pilot symbols from the base station so as to save "overhead." Yet Fuja then says that it would have been obvious to one of

ordinary skill in the art to combine Ritter's data-symbol approach with the very overhead-consuming pilot-symbol approaches Ritter apparently sought to avoid, such as those proposed by Hashem '569, IS-95A, or the Sollenberger article. Fuja is incorrect, and fails to provide evidence of why it would have been obvious to one of ordinary skill in the art to combine Ritter with the other references cited by Fuja, which addressed a very different, if not incompatible, pilot-symbol approach that defeats the purpose of Ritter's data-symbol overhead-saving approach. Moreover, unlike Ritter, neither IS-95A nor Hashem '569 was an OFDMA system. One of ordinary skill in the art would not be motivated to combine these references with Ritter. Lastly, Fuja is not picking from a limited field of art here, but rather a massive one that covers decade of time, involved the largest companies in the industry, and includes many approaches that did not and could not reach the performance and benefits of the Adaptix approach. Dr. Fuja now treats Adaptix's invention as trivial, despite the historical record demonstrating the contrary.

Element 8[d] – "the subscriber sending an indication of coding and modulation rates that the subscriber desires to employ for each cluster."

51. Fuja admits that Ritter does not disclose this element, and instead relies on picking and choosing pieces of Hashem '569 to combine with Ritter, such as Hashem's Link Mode feedback approach, to attempt to show obviousness. There is no reason that can be gleaned from the references or from any other basis for modifying Ritter to include the Link Mode approach of Hashem. Ritter already, as Fuja notes, indicates selected suitable segments, and there is no reason to indicate more information about those segments. Moreover, Ritter teaches that

the priority list of the preferred segments is numbered according to their suitability for the connection with that mobile station. In order to modify this feedback approach to incorporate the Link Mode approach of Hashem '569, the list of preferred segments would have to be accompanied by an index indicating which Link Mode corresponds to which segment. That would increase the size of the feedback message and consumes more overhead. Given that Ritter measured channel information but chose not to feed it back clearly teaches away from the non-OFDMA channel feedback scheme of Hashem. As such, the combination of Hashem '569 with Ritter actually teaches away from element 8[d].

52. Further, a careful examination of both the Ritter and Hashem references shows that their inventors did not appreciate the nature of the problem of wireless channels in a mobile multi-user system, and therefore took different approaches which were better suited to non-mobile scenarios. In a mobile multi-user wireless system, the most efficient use of the downlink can be realized by the base station knowing how good each part of the channel is for each user—something both Ritter and Hashem teach away from. In Ritter's case, the network (base station) has no idea how good any particular channel is, just that for a given user it is relatively better than others. Accordingly, to a person of ordinary skill, this suggests that the system is designed to meet a certain minimum service requirement (threshold), which might work well for a fixed system, but not with a view to trying to maximize efficiency by having a detailed view of each user's channel conditions across a number of frequency channels. This is important in a multi-user mobile network where one user may be close to the base station (and

have good channel conditions across a number of frequencies and the best conditions at channel X) and another user far from the base station (and have good conditions on only channel X). If both users wanted channel X, the base station might give X to the user closest to the base station because it would not know how good or bad each user's second choice was. And clearly this would not be the best choice for optimizing throughput for all users in a multi-user system. A person of ordinary skill in the art around the time of the invention of the '212 and '748 Patents looking at this would not see the fourth-generation, or "4G," solution of Adaptix, as is clear from the historical record.

53. For this reason, and for the reasons set forth in the introduction to this section of my analysis, it would not be obvious to one of ordinary skill in the art to combine Hashem '569 with Ritter and therefore this claim element in not rendered obvious.

6. Claim 8 of the '748 Patent is not Rendered Obvious by the Sollenberger Publications in combination with Hashem '569

54. The following analysis demonstrates that claim 8 of the '748 Patent is not rendered obvious by the Sollenberger Publications in combination with Hashem '569. As a preliminary matter, Fuja combines the Sollenberger Patent and the Sollenberger Article at times, as though they are one cohesive reference, which he refers to as the Sollenberger Publications. This combination itself would not be obvious, nor would one of ordinary skill in the art be motivated to do so. The Sollenberger Patent and the Sollenberger Article were published two years apart, describe two completely different systems that are not related, and, moreover, teach away from each other because of the different approaches they take to

channel feedback and assignment. The Sollenberger Article does not reference the Sollenberger Patent, which suggests that not even Sollenberger himself was motivated or found it obvious to combine the approach of the Sollenberger Patent with the approach of the Sollenberger Article. The Sollenberger Patent does not disclose OFDM and accordingly does not disclose clusters of subcarriers. The Sollenberger Patent teaches a DPA protocol in which a base station "learns" the most preferred channels over time and continually favors the most preferred channels for assignment by use of an ordered priority list. This alone shows Sollenberger was not thinking about an OFDM based solution where there are potentially thousands of subcarriers, for individual channel feedback is not practical in such contexts (too severe of overhead penalty or too granular of feedback). Similar to Ritter, this is the way the Sollenberger inventors saw the world. That is to say their systems would try to find a channel that is best for a new user when the new user comes on the system, but without knowing how good (just relatively better than the others) and then this new user would keep this channel long term. This may not be a bad approach for a fixed (*i.e.*, pedestrian speed) wireless network, but it is not well suited to the highly mobile environment at which the Adaptix inventions were aimed. A "channel" in this context is a logical channel that is physically handled as a particular timeslot of a particular carrier frequency. This particular timeslot of a particular carrier frequency, once assigned to a wireless station, is reserved until all packets in the queue for that wireless station are delivered, or until another DPA update is performed by a base station. Going a completely different direction to his patent, the Sollenberger

Article uses "channel" to refer to a particular frequency hopping pattern associated with a single radio resource. In the Patent, each user is on a particular frequency, but in the Article, a particular hopping pattern is used by each user which employs many frequencies, which are reused by other hopping patterns but at different times. Accordingly, the Sollenberger Patent's approach to channel allocation is to learn and target the most preferred frequencies, whereas one of the primary goals of the Sollenberger Article is to achieve diversity by rapidly hopping between different frequencies. Thus, these references teach away from each other in this regard.

55. The Sollenberger Patent describes a system where the subscriber feedback is limited to a list of the first L acceptable channels, and, like Ritter, only provides feedback on preferred channels, not how good they are. In contrast, Sollenberger takes an entirely different approach to the problem of the wireless channel in his Article and instead provides feedback on the interference levels of various frequency hopping patterns which utilize the same frequencies but at different predetermined times. Finally, Hashem '569 takes yet another approach, entirely different from both of Sollenberger's approaches, and provides feedback on the quality all subcarriers, including both acceptable and unacceptable subcarriers, to decide how best to use those subcarriers for one user. So Sollenberger's Patent, like Ritter, did not understand the importance of feeding back how good a channel is (*i.e.*, the degree), on a frequency basis, to a mobile multi-user wireless system. In his Article, Sollenberger gives up on frequency specific channel information altogether and simply focusses on interference on predetermined patterns which

are designed to ensure at least some of the transmission will occur on good frequencies (diversity), which is the opposite of trying to find the best parts of the overall channel for a user. And a person of skill looking at the Sollenberger Patent would not look to Hashem to improve the multi-user system, as Hashem taught away from users sharing frequencies at the same time. Furthermore, Hashem's approach of providing feedback on the degree of all channels would necessitate more overhead, which conflicts with Sollenberger's notion of merely providing a list of preferred channels, and not how qualitatively good they are. Finally, one looking to improve the approach set out in Sollenberger's Article would not look to Hashem which teaches away from achieving diversity through frequency hopping by providing frequency specific channel feedback, as this information would increase overhead and be irrelevant to a frequency hopping system.

56. Further, the Sollenberger Article's statement, cited by Fuja, about DPA and adaptive modulation and coding is purely aspirational, because adaptive modulation and coding was not analyzed or used in the actual DPA protocol presented in the Article. In fact, Fuja's citation is pulled from the *Conclusions and Discussions*, and conflicts with a similar statement from the *Abstract* that lists the topics discussed in the paper, and which makes no mention of adaptive coding and modulation. This statement from the *Abstract* is consistent with the actual protocol presented, which discusses a single modulation and coding rate being used statically throughout the DPA process, not adaptively. Therefore, it would

not be obvious to one of ordinary skill in the art to combine Hashem '569 with either (or both) of the Sollenberger Publications.

Preamble – "A method for subcarrier selection for a system employing orthogonal frequency division multiple access (OFDMA) comprising."

57. The limitations throughout this claim employ OFDMA. Therefore, this preamble breathes life and meaning into the claim. Hashem '569 does not disclose this element because it does not disclose multiple access. The Sollenberger Patent does not disclose OFDMA, nor does it teach an OFDMA approach. Thus, one of ordinary skill would not be motivated to combine these references for purposes of meeting the limitation of this preamble, as these references, alone or in combination, fail to even teach an OFDMA approach. I hereby incorporate my analysis of the preamble to claim 8 set forth above at the beginning of my discussion of the '748 Patent.

Element 8[d] – "the subscriber sending an indication of coding and modulation rates that the subscriber desires to employ for each cluster."

58. Fuja admits that neither of the Sollenberger Publications discloses this element, but he is incorrect that this element is rendered obvious by combining the Sollenberger Publications with Hashem '569. One of ordinary skill in the art would not have combined Hashem '569 with the Sollenberger Publications because, in addition to the reasons detailed immediately above, these references each teach away from each other and are incompatible.

59. The feedback of the Sollenberger Patent is limited to a list of the first L acceptable channels. No additional feedback information beyond this list is disclosed and no information about remaining channels is sent. Sollenberger does

not disclose feedback indicating coding and modulation rates. As soon as L acceptable channels are identified, the wireless station exits the scanning process. Similar to Ritter, by considering channel quality but not feeding it back, the Sollenberger Patent teaches away from providing channel quality feedback and similarly highlights that Sollenberger did not appreciate the problem of the wireless channel in a multi-user mobile wireless network. Accordingly, one reading the Sollenberger Patent would not look to the channel quality feedback approach of Hashem '569 as that would be contrary to the express teaching and not directed to a system where users used different frequencies at the same time (as the Sollenberger Patent does). This is especially true given that Hashem '569 provides feedback on all channels (subcarriers), including both acceptable and unacceptable subcarriers, something Sollenberger was avoiding by merely identifying a minimum subset of acceptable channels. One of ordinary skill in the art would understand that this bitmask format was designed to reduce overhead, as it contains only one bit to indicate whether the corresponding subcarrier is acceptable and the desired Link Mode for that subcarrier.

60. The requirement of adding an index to Sollenberger's feedback approach, and thus increasing the overhead demand, is a further deterrent to combining his approach with that of Hashem and something Sollenberger chose not to do. Hashem's Link Mode feedback approach uses a bitmask corresponding to subcarriers, and because it provides feedback on all subcarriers in sequential order, no index is needed identifying which desired Link Mode corresponds to which subcarrier. However, the Sollenberger Patent does not provide feedback on

all channels and not in sequential order, and thus if it were to employ a coding and modulation feedback approach, it would have to include an index identifying which indication of coding and modulation rates corresponds to which channel in the list of L channels, which eats up more overhead due to the larger message size.

61. As for Fuja's suggestion that one of ordinary skill in the art would be motivated to combine the Sollenberger Article's approach with that of Hashem '569, he is incorrect. The Sollenberger Article was not concerned with frequency specific channel quality information because it is a frequency hopping system where frequencies are reused in time. Accordingly, there would be no point to look to the frequency specific channel information of Hashem because it is irrelevant. To that end, one of ordinary skill would not be motivated to combine the Sollenberger Publications with the approach of Hashem '569. The only reference among the two Sollenberger Publications that addressed OFDMA is the Sollenberger Article, which came after the Patent. And as noted above, it is not obvious to take the Sollenberger Article and look to the channel feedback schemes of either Hashem '569 or the Sollenberger Patent, because both of those schemes are based on frequency, which is irrelevant to the Sollenberger Article's frequency hopping scheme. Lastly, it was apparently not even obvious to Sollenberger himself to combine OFDMA with frequency specific channel quality information.

62. Hashem is not a multi-user OFDMA system. In order to transmit the Link Mode information disclosed in Hashem, the feedback in the Sollenberger Patent could

no longer just contain the list of L acceptable channels, but would also need to contain an index indication of which Link mode corresponds to which channel in the list of L channels. This consumes more overhead, the very thing Hashem's bitmask approach was designed to avoid. Therefore, one of ordinary skill in the art would not be motivated to combine these references that teach away from each other, and thus claim element 8[d] is not rendered obvious.

7. **Claim 9 of the '748 Patent is not Anticipated or Rendered Obvious by Hashem '569**

63. Claim 9 reads: "The method defined in claim 8 wherein the indication of coding and modulation rates comprises an SINR index indicative of a coding and modulation rate.

64. Claim 9 depends from claim 8 and recites further limitations. Therefore, for at least the reasons set forth above with respect to the preamble to claim 8, claim 9 is not anticipated or rendered obvious by Hashem '569.

65. Fuja's reliance on the IS-95A Standard is misplaced, as that standard was based on CDMA technology, which, unlike OFDMA, does not separate users by frequency but rather uses orthogonal codes to allow users to share the same frequency band at the same time. Thus, CDMA is fundamentally different from OFDMA. As such, any reliance on IS-95A (CDMA) has no bearing on OFDMA which is the subject of the asserted claims. Moreover, claim 9 depends from claim 8 and recites a limitation relating to element 8[d]. Element 8[d] requires that the subscriber send an indication of the coding and modulation rate it desires for each *cluster*. Fuja provides no evidence that the IS-95A Standard disclosed clusters. In fact, CDMA (IS-95A) is incompatible with clusters of channels

separated by frequency because all channels in CDMA embodiments occupy the exact same bandwidth. As such, the notion of clustering channel in IS-95A makes no sense. Thus, the IS-95A Standard provides no teaching or basis that would have made it obvious to utilize an SINR index to indicate coding and modulation rates for clusters of subcarriers when that Standard itself did not address or otherwise disclose clusters. Furthermore, Fuja fails explain how a message regarding the measured strength of a pilot constitutes an SINR index, or even how adding ratios of received pilot energy to total received power spectral density involves interference. Lastly, the Pilot Strength Measurement Message from the IS-95A Standard makes no mention of interference or SINR, never mind an SINR index indicative of a coding and modulation rate.

8. Claim 9 of the '748 Patent is not Rendered Obvious by Ritter in combination with Hashem '569

66. Claim 9 depends from claim 8 and recites further limitations. Therefore, for at least the reasons set forth above with respect to the preamble to claim 8, claim 9 is not anticipated or rendered obvious by Hashem '569. For the reasons set forth above with respect to claims 8 and 9, particularly element 8[d], claim 9 is not rendered obvious by Ritter in combination with Hashem '569.

9. Claim 9 of the '748 Patent is not Rendered Obvious by the Sollenberger Publications in combination with Hashem '569

67. Claim 9 depends from claim 8 and recites further limitations. Therefore, for at least the reasons set forth above with respect to the preamble to claim 8, claim 9 is not anticipated or rendered obvious by Hashem '569. For the reasons set forth above with respect to claims 8 and 9, particularly element 8[d], claim 9 is not

rendered obvious by the Sollenberger Publications in combination with Hashem '569.

10. **Claim 11 of the '748 Patent is not rendered obvious by Ritter in combination with Haartsen '837 or Liu '315**

Element 11[b][1] – "a first base station in the first cell, in response to receiving inter-cell interference information, coordinates with other cells to make a cluster assignment decision."

68. Fuja admits that Ritter does not disclose a base station which "coordinates with other cells to make a cluster assignment decision." Fuja para. 635. However, Fuja asserts that it would have been obvious to combine Ritter with Haartsen '837 or Liu '315 to provide a modified Ritter system that has this element.

69. As pointed out by Fuja, Ritter's method takes into consideration and reduces or eliminates altogether intercellular interference. Thus, per Ritter, there is no need to in response to the receipt of inter-cell interference information, to coordinate with other cells to make cluster assignment decisions. Fuja supplies no reason why one would modify Ritter to add the coordination with other cells, in response to the receipt of inter-cell interference information. Therefore, it would not have been obvious to so modify the Ritter system – in view of either the Haartsen '837 or Liu '315 patents, as asserted by Fuja.

70. In addition, as Haartsen is not an OFDMA system, it would be necessary make additional modifications to Ritter in order to incorporate the inter-cell features of Haartsen. Fuja provides no reason for doing so that would benefit the system of Ritter. For example, one would have to decide the way in which assignments in Ritter might be modified based on the inter-cell information per the teachings of Haartsen. Fuja, without any evidence, states that one would use the information

for cluster assignment. One of ordinary skill in the art would not consider modifying Ritter to include the features of Haartsen, and even if one were to make a modification, additional decisions would have to be made as to how – which would not necessarily result in a system that makes cluster assignment decisions based on inter-cell information (e.g., as opposed to another type of channel assignment decision).

71. Liu '315 provides no teaching that would motivate one of ordinary skill in the art to modify the Ritter system to include this element. Such a modification would still result in changes to Ritter, while Ritter already states that its method takes into consideration and reduces or eliminates altogether intercellular interference. Thus, per Ritter, there is no need, in response to the receipt of inter-cell interference information, to coordinate with other cells to make cluster assignment decisions. Again, Fuja supplies no reason why one would modify Ritter to add the coordination with other cells, in response to the receipt of inter-cell interference information.

72. Liu '315, as noted by Fuja, teaches that a system can coordinate among base stations in connection with traffic channel assignment. However, Fuja does not show any evidence that such a coordination would involve a coordination "in response to receiving inter-cell interference information" as the claim requires. Therefore, even if one were to modify the Ritter system to coordinate among base stations, there is no evidence that would suggest doing so in the way claimed – i.e., in response to receiving inter-cell interference information.

11. Claim 11 of the '748 Patent is not Rendered Obvious by the Sollenberger Publications in Combination with Haartsen '837 or Liu '315

73. The Sollenberger references also teach determining interference information, and using that information to improve channel allocation. Per Fuja, however, these references do not disclose a base station that coordinates with other cells to make a cluster assignment decision. For the reasons noted above with respect to Ritter and Haartsen and Liu, there is no evidence pointed out by Fuja of a reason or motivation to modify either of the Sollenberger references to coordinate with other cells to make cluster assignment decisions. In fact, given the teachings of Sollenberger, which already allegedly takes interference information into account in a method that works well, making such a modification as alleged by Fuja would be going against the teachings of the Sollenberger references. In addition, even if one were to modify a system to coordinate among cells per the teachings of either Haartsen or Liu, there is no teaching that such coordination is "in response to receiving inter-cell interference information," another limitation of the claim.

12. Claim 11 of the '748 Patent is not rendered obvious by Hashem '569 in combination with Haartsen '837 or Liu '315

74. As noted herein, e.g., with respect to claim 8 herein, Hashem does not disclose an OFDMA system. Moreover, for the reasons noted in the discussion of claim 8 herein, it would not have been obvious to modify Hashem to include an OFDMA system. For these reasons alone, claim 11 is not rendered obvious by Hashem '569 in combination with Haartsen '837 or Liu '315. In addition, Fuja acknowledges that Hashem does not disclose the coordination with other cells to

make cluster assignment decisions. Hashem also does not teach doing such coordination in response to receiving inter-cell interference information, another limitation required in this element.

75. It would not have been obvious to modify Hashem to include these specific features (coordination with cells to make cluster assignment decisions, in response to receiving inter-cell interference information). To the extent Haartsen or Liu allegedly disclose any inter-cell coordination, they do not teach doing so in response to receiving inter-cell interference information. Accordingly, even if one were to modify the Hashem system, the resulting system would not be an OFDMA system, and the inter-cell coordination would not be in response to receiving inter-cell interference information.

13. Claim 19 of the '748 Patent is not Rendered Obvious by Ritter in Combination with the Sollenberger Article and/or the IS-95A Standard

76. For the reasons set forth herein with respect to claims 8 and 21, claim 19 is not rendered obvious by Ritter in Combination with Hashem '569 or the Sollenberger Article and/or the IS-95A Standard.

14. Claim 19 of the '748 Patent is not Rendered Obvious by the Sollenberger Publications

77. For the reasons set forth herein with respect to claims 8 and 21, claim 19 is not rendered obvious by the Sollenberger Publications.

15. Claim 19 of the '748 Patent is not Rendered Obvious by Hashem '569 Alone or in Combination with Ritter

78. For the reasons set forth herein with respect to claims 8 and 21, claim 19 is not rendered obvious by Hashem '569 alone or in combination with Ritter.

16. Claim 20 of the '748 Patent is not Rendered Obvious by Ritter in Combination with Hashem '569

79. For the reasons set forth herein with respect to claim 8, particularly element 8[d], claim 20 is not rendered obvious based on these grounds.

17. Claim 20 of the '748 Patent is not rendered obvious by the Sollenberger Publications in Combination with Hashem '569

80. For the reasons set forth herein with respect to claim 8, particularly element 8[d], claim 20 is not rendered obvious based on these grounds.

18. Claim 20 of the '748 Patent is not Rendered Obvious by Hashem '569

81. For the reasons set forth herein with respect to claim 8, particularly element 8[d], claim 20 is not rendered obvious based on these grounds.

19. Claim 21 of the '748 Patent is not Rendered Obvious by Ritter in Combination with the Sollenberger Article or the IS-95A Standard, or Hashem '569

82. The following analysis demonstrates claim 21 of the '748 Patent is not rendered obvious by Ritter in combination with Hashem '569 or the Sollenberger Article or the IS-95A Standard. And for the reasons set forth below, and with respect to claim 8 of the '748 Patent, one of ordinary skill in the art would not be motivated to combine Ritter with Hashem '569 or the Sollenberger Article or the IS-95A Standard to meet the limitations of claim element 21[c][1].

Element 21[c][2] – "based on pilot symbols received from the first base station."

83. Ritter does not disclose measurements based on pilot signals received from a base station, and does not render this claim element obvious. For example, Fuja notes that Ritter proposed a novel measurement technique that avoided the use of known, non-data-bearing pilot symbols from the base station by making

amplitude measurements from data, which saves "overhead." Yet Fuja then says that it would have been obvious to one of ordinary skill in the art to combine Ritter's data-symbol approach with the very overhead-consuming pilot-symbol approaches Ritter's approach avoids, such as those proposed by Hashem '569, IS-95A, or the Sollenberger Article. Fuja is incorrect, and fails to provide evidence of why it would be obvious to one of ordinary skill in the art to combine Ritter with the other references cited by Fuja, which addressed a very different, if not incompatible, pilot-symbol approach that defeats the purpose of Ritter's data-symbol overhead-saving approach. Unlike Ritter, neither IS-95A nor Hashem '569 is an OFDMA system. To modify Ritter to include the pilot-symbol approaches Fuja contends were prevalent at the time requires one to ignore the very teachings of Ritter and the importance of his data-symbol approach. Fuja's citation to a passage from the IS-95A Standard does not disclose a subscriber measuring channel and interference information for a plurality of subcarriers based on pilot signals from a base station. Rather, it discloses mobile stations measuring signal strengths of received pilots. And again, the IS-95A Standard is based upon CDMA, not OFDMA. Also, even where the term "pilots" occurs in the CDMA context, these pilots are used for different purposes from OFDMA; specifically, they are not used in CDMA for frequency specific channel measurements. One of ordinary skill in the art would not be motivated to combine these references with Ritter.

Element 21[c][6] – "wherein the one subscriber sends an indication of coding and modulation rates that the one subscriber desires to employ."

84. Fuja admits that Ritter does not disclose this element, but goes on to say it would be obvious to ignore the express teaching of Ritter to feedback only a preferred channel list and look to a system that is not designed to support multiple users on different frequencies at the same time (*i.e.*, not OFDMA). Because Ritter teaches measuring channel information but *not* feeding it back, Fuja ignores Ritter's teachings by saying it would be obvious to add the feedback approach of Hashem. There is no reason or motivation that can be gleaned from the references or from any other basis for modifying Ritter to include the Link Mode approach of Hashem. Ritter already, as Fuja notes, indicates selected suitable segments, which shows that Ritter did not appreciate the nature of the problem of the wireless channel in a multi-user mobile wireless network and accordingly the Ritter system would not work very well in that context. In fact, Fuja provides no evidence that either Ritter's approach or that of Hashem was ever used for mobile multi-user wireless communication systems. In fact, these are variations on the same approaches considered and rejected by the industry at the ETSI 3G meeting, which demonstrates that Adaptix's approach—which was ultimately chosen by the industry for 4G—was by no means obvious.

85. One would not look to a non-OFDMA system like Hashem's for purposes of an OFDMA system. Moreover, Ritter teaches that the priority list of the preferred segments is numbered according to their suitability for the connection with that mobile station. But note that this leaves the base station without any information of just how good any given segment is, just that it is relatively better than another. Accordingly, the system cannot realize the same performance benefits of the

claimed invention, which can make use of the degree of channel information across a number of frequencies in an OFDMA system which is the best solution for mobile wireless multi-user systems. Furthermore, in order to modify this feedback approach to incorporate the Link Mode approach of Hashem '569, the list of preferred segments would have to be accompanied by an index indicating which Link Mode corresponds to which segment. This increases the size of the feedback message and consumes more overhead, which was the very thing Ritter was trying to avoid by only feeding back a list of preferred segments. For this reason, and for the reasons set forth in the introduction to and analysis of claim element 8[d], above, it would not have been obvious to one of ordinary skill in the art at the time of the '748 invention to combine Hashem '569, or any of the other references cited by Fuja, with Ritter. Therefore, this claim element in not rendered obvious.

20. Claim 21 of the '748 Patent is not Rendered Obvious by the Sollenberger Publications, in Combination with Hashem '569

86. The following analysis demonstrates claim 21 of the '748 Patent is not rendered obvious by the Sollenberger Publications in combination with Hashem '569. I incorporate by reference my analysis in the introduction to Claim 8, above, regarding the combination of the Sollenberger Publications and Hashem '569. Additionally, the Sollenberger Patent does not feedback quality information, just an identification of the channels, which, similar to Ritter, results in a less optimum use of the given spectrum and shows that Sollenberger failed to appreciate the nature of the problem of the wireless channel in mobile multi-user wireless systems. As described above, the Sollenberger Article gives up on

frequency specific channel allocations and instead uses frequency hopping patterns for which frequency specific channel quality feedback is irrelevant. And Hashem was not an OFDMA system, and was not directed towards multi-user mobile wireless systems, and his scheme would increase overhead for the Sollenberger Patent and is irrelevant to the Sollenberger Article's approach.

Element 21[c][6] – "wherein the one subscriber sends an indication of coding and modulation rates that the one subscriber desires to employ."

87. I incorporate by reference my argument from above regarding claim element 8[d].

88. Fuja admits that neither of the Sollenberger Publications discloses this element, but he is incorrect that this element is rendered obvious by combining the Sollenberger Publications with Hashem '569. One of ordinary skill in the art would not have combined Hashem '569 with the Sollenberger Publications because, in addition to the reasons detailed immediately above, these references teach away from each other and are incompatible.

89. The feedback of the Sollenberger Patent is limited to a list of the first L acceptable channels. No additional feedback information beyond this list is disclosed and no information about remaining channels is sent. As soon as L acceptable channels are identified, the wireless station exits the scanning process. Thus, the list of L channels is less than all channels. In contrast, Hashem '569 provides feedback on all channels (subcarriers), including both acceptable and unacceptable subcarriers, using a bitmask corresponding to the subcarriers in sequential order. One of ordinary skill in the art would understand that this bitmask format was designed to reduce overhead, as it contains only one bit to

indicate whether the corresponding subcarrier is acceptable and the desired Link Mode for that subcarrier.

90. In order to transmit the Link Mode information disclosed in Hashem, the feedback in the Sollenberger Patent could no longer just contain the list of L acceptable channels, but would also need to contain an index indication of which Link mode corresponds to which channel in the list of L channels. This consumes more overhead, the very thing Hashem's bitmask approach was designed to avoid. Therefore, one of ordinary skill in the art would not be motivated to combine these references, and thus claim element 821[c][6] is not rendered obvious.

21. **Claim 21 of the '748 Patent is not Rendered Obvious by Hashem '569 Alone or in Combination with Ritter**

91. The following analysis demonstrates claim 21 of the '748 Patent is not rendered obvious by Hashem '569 alone or in combination with Ritter. I incorporate by reference my analysis in the introduction to Claim 8, above, regarding Hashem alone, as well as the combination of Ritter and Hashem '569, as well as my analysis of the preamble to claim 8.

Element 21[a] – "a plurality of subscribers in a first cell to generate feedback information indicating clusters of subcarriers desired for use by the plurality of subscribers."

92. Hashem '569 does not disclose this element and does not render it obvious. As has been discussed in detail throughout this Report, Hashem '569 does not disclose an OFDMA system, but rather teaches away from such a system. Rather than assigning subcarriers that are unacceptable for one user to another user for whom they are acceptable, Hashem teaches ways to use the unacceptable subcarriers for transmitting less important information or to not use them and just

borrow their transmission power. Thus, Hashem '569 fails to appreciate the benefit of using OFDMA in a multi-user mobile wireless system where channels which are bad for one user can be good for another, and teaches away from an OFDMA approach. Fuja is incorrect that one skilled in the art would "immediately understand the teaching of Hashem '569 to relate to systems to include multiple subscribers," at least not in an OFDMA context. OFDM and OFDMA are different, and while OFDM can be used in conjunction with a multiple access scheme, such as TDMA, the combination of OFDM and TDMA is not the same thing as OFDMA. Hashem '569 teaches away from an OFDMA solution, as evidenced by its focus specifically on ways to use all the subcarriers or subbands in different ways or for different purposes *for the one user*, not for multiple users at the same time. This is important because the '748 patent is directed towards OFDMA systems, where subcarriers that are not acceptable for one user can be allocated to a different user for whom they are acceptable in the same scheduling interval, or TTI. '748 Patent at 1:43-53. Hashem '569, on the other hand, does not teach having the base station indicate which subcarriers are to be used, which is further evidence that Hashem was not thinking of a multi-user OFDMA system that can allocate subcarriers so that each of multiple subscribers enjoys good channel quality simultaneously. It teaches ways to use all subcarriers for transmission to a single user at a time, even those that are considered unacceptable, such as by transmitting lower priority traffic on them or borrowing their power to use for transmission on the better subcarriers. Therefore, the knowledge of a person of ordinary skill in the art would not render

obvious adding an OFDMA scheme such as that of Ritter, which Hashem '569 teaches away from, with Hashem '569.

Element 21[b] – "a first base station in the first cell, the first base station to allocate OFDMA subcarriers in clusters to the plurality of subscribers."

93. For the reasons set forth immediately above in claim element 21[a], Hashem '569 alone does not disclose or render obvious this element, nor does Hashem '569 in combination with Ritter render obvious this element. I incorporate by reference my analysis in the introduction to Claim 8, above, regarding the combination of Ritter and Hashem '569, as well as my analysis of the preamble to claim 8.

Element 21[c][2] – "based on pilot symbols received from the first base station."

94. For the reasons set forth above in element 21[a] and in my analysis of element 21[c][2] with respect to Ritter in combination with Hashem '569 or the Sollenberger Article or the IS-95A Standard, Hashem '569 alone does not disclose or render obvious this element, nor does Hashem '569 in combination with Ritter render obvious this element. I incorporate by reference my analysis in the introduction to Claim 8, above, regarding the combination of Ritter and Hashem '569, as well as my analysis of the preamble to claim 8.

Element 21[c][5] – "receive an indication of subcarriers from the set of subcarriers selected by the first base station for use by the one subscriber."

95. For the reasons set forth above in element 21[a] and in my analysis of element 21[c][2] with respect to Ritter in combination with Hashem '569 or the Sollenberger Article or the IS-95A Standard, Hashem '569 alone does not disclose or render obvious this element, nor does Hashem '569 in combination

with Ritter render obvious this element. I incorporate by reference my analysis in the introduction to claim 8, as well as my analysis of the preamble to claim 8 and claim element 8[e].

22. Claim 22 of the '748 Patent is not Rendered Obvious by Ritter in Combination with Hashem '569 or the IS-95A Standard

96. For the reasons set forth above with respect to claim 8, particularly element 8[d], as well as my analysis for claims 9 and 21, claim 22 of the '748 is not rendered obvious by Ritter in combination with Hashem '569 and/or the IS-95A Standard.

23. Claim 22 of the '748 Patent is not Rendered Obvious by the Sollenberger Publications in Combination with Hashem '569

97. For the reasons set forth above with respect to claim 8, particularly element 8[d], as well as my analysis for claims 9 and 21, claim 22 of the '748 is not rendered obvious by the Sollenberger Publications in combination with Hashem '569.

24. Claim 22 of the '748 Patent is not Rendered Obvious by Hashem '569 Alone or in Combination with Ritter

98. For the reasons set forth above with respect to claim 8, particularly element 8[d], as well as my analysis for claims 9 and 21, claim 22 of the '748 is not rendered obvious by Hashem '569 alone or in combination with Ritter.

B. '212 PATENT

99. Fuja's assertions of invalidity for the asserted claims of the '212 Patent repeat, incorporate, cross-reference, or otherwise involve many of the same combinations of references he asserts with respect to the claims of the '748 Patent. My analysis with respect to these obviousness assertions from the '748 are herein incorporated by reference and apply equally to the '212 claims analyzed below. I also

incorporate by reference my analysis of the preamble of claim 8 of the '748 Patent with respect to all claims below.

1. Claim 1 of the '212 Patent is not Rendered Obvious by Ritter in Combination with Hashem '569 or the Sollenberger Article or the IS-95A Standard

100. The following analysis demonstrates claim 1 of the '212 Patent is not rendered obvious by Ritter in combination with Hashem '569 or the Sollenberger Article or the IS-95A Standard. I hereby incorporate by reference my analysis of the Asserted Claims of the '748 Patent as to why one of ordinary skill in the art would not be motivated to combine Ritter with Hashem '569 or the Sollenberger Article and/or the IS-95A Standard.

101. For the reasons set forth in my analysis of claims 8 and 21 of the '748 Patent, claim 1 of the '212 Patent is not rendered obvious by Ritter in combination with Hashem '569 or the Sollenberger Article or the IS-95A Standard.

Element 1[e][1] – "the subscriber unit submitting updated feedback information, after being allocated the set of subcarriers to be allocated an updated set of subcarriers, and thereafter."

102. Fuja is incorrect when he states that this element is disclosed by Ritter. Ritter simply does not disclose the subscriber updating feedback. Ritter, as established in the File History of the '212 patent, does not disclose the updating of feedback and of allocation. *See, e.g.*, the Notice of Allowance with Reasons for Allowance dated August 22, 2008 at 4 ("The prior art of record [which included Ritter] does not teach or fairly suggest … submitting updated feedback information to be allocated an updated set of sub-carriers and thereafter the

subscriber unit receiving another indication of the updated set of sub-carriers"). Ritter does not disclose that reporting by the mobile stations should be performed repeatedly, or updated, because the propagation characteristics to and from mobile stations change. Ritter does not mention the need for updated measurement by the mobile stations, updated transmission of the mobile stations' findings to the base station, or updated re-allocations of subcarriers by the base station. This shows that Ritter did not have an appreciation of the nature of the wireless channel in a multi-user mobile wireless system, namely that channel conditions can vary quickly. Accordingly, Ritter's system would be better suited for fixed wireless where long term channel conditions exist, but not a mobile system where a channel that provided good quality a moment ago can be very poor the next moment.

103. Instead, Ritter discusses how the base station can individually modify the "specific communication connection" with a user after determining the most suitable segments for each of the other users served by the base station. So while a user's communication connection might be individually modified, it is based on the another user's most suitable segment information being evaluated—and perhaps, though not conceded, a new user seeking a connection adding his most suitable segment to that pool of information—but nothing suggests updated channel feedback from the same user.

104. Fuja alternatively relies on the Sollenberger Article as a reference that teaches updating of feedback and thereafter updating of allocations. However, the Sollenberger Article's approach differs fundamentally from that of Ritter. That is,

Sollenberger does not target a particular segment for allocation, but rather provides interference information on a particular frequency-hopping pattern that results in packets being transmitted on 8 different "tone clusters" in each of the 8 different traffic slots. Therefore, Sollenberger teaches away from using frequency specific channel quality feedback and is simply concerned with finding a frequency hopping pattern not being used by others on neighboring base stations. Ritter, on the other hand, seeks to target a particular frequency segment in one portion of the spectrum. These systems are fundamentally different in their general approach to providing feedback and making resource allocations, not to mention incompatible in regards to how they determine and measure channel information, given that information on specific frequencies would be irrelevant to Sollenberger's frequency hopping scheme. For these reasons, and for those set forth in my analysis of element 21 of the '748 Patent, one of ordinary skill would not combine these fundamentally different references.

Element 1[e][2] – "the subscriber unit receiving another indication of the updated set of subcarriers."

105. For the reasons set forth immediately above, and in my analysis of element 21 of the '748 Patent, Ritter does not disclose this claim element, and one of ordinary skill would not combine the fundamentally different references relied upon by Fuja. Also, for reasons previously explained, given Hashem '569 is not an OFDMA system, there is no teaching regarding identifying allocated subcarriers. The Sollenberger Patent does not teach OFDM and therefore does not teach subcarriers.

2. Claim 1 of the '212 Patent is not Rendered Obvious by the Sollenberger Publications

106. The following analysis demonstrates claim 1 of the '212 Patent is not rendered obvious by the Sollenberger Publications. I hereby incorporate by reference my analysis of the Asserted Claims of the '748 Patent as to why one of ordinary skill in the art would not be motivated to combine the Sollenberger Patent with the Sollenberger Article.

Preamble – "A method for subcarrier selection for a system employing orthogonal frequency division multiple access (OFDMA) comprising."

107. Fuja states that this element is satisfied by the disclosure set forth at '748 Patent claim 1 preamble. No such section exists in Fuja's Report. Therefore, Fuja has failed to provide any analysis or evidence that the Sollenberger Publications render obvious this claim element.

Element 1[b] – "the subscriber selecting a set of candidate subcarriers."

108. The Sollenberger Publications do not render obvious element 1[b]. Additionally, I incorporate by reference my analysis of the Asserted Claims of the '748 Patent as to why one of ordinary skill in the art would not be motivated to combine Sollenberger Patent with the Sollenberger Article. For the reasons set forth below, neither reference discloses element 1[b], and thus the combination of the two references does not disclose, anticipate, or render obvious element 1[b]. Even if one of the references individually disclosed this element, one of ordinary skill would not combine the two, because it would require improperly picking and choosing bits and pieces from each of these very different systems, and ignoring contrary teachings in each.

109. First, the Sollenberger Patent is not directed towards or implemented in an OFDMA system, and thus the L "acceptable channels" supposedly "selected" are not "subcarriers" as that term is used in claim 1 of the '212 Patent, whose preamble explicitly notes it is designed for a system employing OFDMA. A "channel," in the context of the Sollenberger Patent, is a particular timeslot of a particular carrier frequency, not an OFDMA subcarrier.

110. Second, it is not obvious to modify the Sollenberger Patent to make it apply to OFDMA as evidenced by the fact that Sollenberger himself did not do so. Instead of modifying the Patent to implement OFDMA, as Fuja says was obvious, Sollenberger instead chose to eschew frequency specific channel feedback and allocations in favor of analyzing interference on various frequency hopping patterns. Fuja ignores the fact that the Sollenberger Article does not select "a set of candidate subcarriers" in the same sense as the Sollenberger Patent selects distinct channels (*i.e.*, based on frequency specific channel information). Identifying a frequency hopping pattern alone provides no information regarding frequency specific channel information. It merely provides information on whether that pattern is being used by another (*e.g.*, on a neighboring base station). The terminal in the Sollenberger Article does not select subcarriers for purposes of identifying preferred frequencies for frequency specific channel allocations, but rather frequency hopping patterns which make use of the same frequencies but according to different predetermined schedules in time so as to achieve diversity. The Sollenberger Article therefore teaches away from the notion of using frequency specific channel feedback and allocations by employing a diversity

scheme designed to spread communications over all frequencies, good and bad. Alternatively, the frequency specific channel information of the Sollenberger Patent would be irrelevant to a system based on frequency hopping.

Element 1[c] – "the subscriber providing feedback information on the set of candidate subcarriers to the base station."

111. The Sollenberger Publications do not render obvious element 1[c], for at least the reasons set forth in my analysis of element 1[b]. For the reasons set forth below, neither reference discloses element 1[c], and thus the combination of the two references does not disclose, anticipate, or render obvious element 1[c]. Even if one of the references individually disclosed this element, one of ordinary skill would not combine the two, because it would require improperly picking and choosing bits and pieces from each of these very different systems, and ignoring contrary teachings in each.

112. Additionally, the Sollenberger Patent does not disclose the subscriber providing any feedback information to the base station beyond the L-acceptable-channels list itself. Thus, the Sollenberger Patent does not disclose the subscriber providing feedback information *on* the L acceptable channels, but rather just the list of the L channels. The Sollenberger Article may provide feedback information—though it never defines "potential transmission quality"—but it does so on frequency hopping patterns, not a selected set of candidate subcarriers.

3. Claim 1 of the '212 Patent is not Rendered Obvious by Hashem '569 Alone or in Combination with Ritter

113. The following analysis demonstrates claim 1 of the '212 Patent is not rendered obvious by Hashem '569 alone or in combination with Ritter. I

incorporate by reference my analysis in the introduction to claim 8 of the '748 Patent, above, regarding the combination of Ritter and Hashem '569, my analysis of the preamble to claim 8 of the '748, and my analysis above as to Ritter in combination with Hashem '569.

Preamble – "A method for subcarrier selection for a system employing orthogonal frequency division multiple access (OFDMA) comprising."

114. Hashem '569 does not render obvious the preamble of claim 1 of the '212 Patent, for the reasons set forth in my analysis for the preamble of claim 8 of the '748 Patent, which is incorporated here by reference, as is my analysis in the introduction to claim 8 of the '748 Patent, above, regarding the combination of Hashem '569 and Ritter.

Element 1[d] – "the unit subscriber receiving an indication of subcarriers of the set of subcarriers selected by the base station for use by the subscriber unit; and."

115. My analysis from claim 8 of the '748 Patent, particularly claim element 8[e] and 8[d], demonstrates why this claim is not rendered obvious by Hashem '569 alone or in combination with Ritter.

Element 1[e][2] – "the subscriber unit receiving another indication of the updated set of subcarriers."

116. My analysis from claim 8 of the '748 Patent, particularly claim element 8[e], demonstrates why this claim is not rendered obvious by Hashem '569 alone or in combination with Ritter. I also hereby incorporate my discussions above regarding why one of ordinary skill would not combine Hashem '569 with Ritter, which demonstrates why this claim element is not rendered obvious.

4. Claim 8 of the '212 Patent is not Rendered Obvious by Ritter in Combination with Hashem '569 or the Sollenberger Article and/or the IS-95A Standard

117. Claim 8 depends from claim 1 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 of the '212 Patent, claim 8 is not rendered obvious by Ritter in combination with Hashem '569 or the Sollenberger Article or the IS-95A Standard, nor would one of ordinary skill in the art be motivated to combine such disparate references.

5. Claim 8 of the '212 Patent is not Rendered Obvious by the Sollenberger Publications

118. Claim 8 depends from claim 1 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 of the '212 Patent, claim 8 is not rendered obvious by the Sollenberger Publications, nor would one of ordinary skill in the art be motivated to combine such disparate references.

6. Claim 8 of the '212 Patent is not Rendered Obvious by Hashem '569 Alone or in Combination with Ritter

119. Claim 8 reads: "The method defined in claim 1 further comprising the base station selecting the subcarriers from the set of candidate subcarriers based on additional information available to the base station."

120. Claim 8 depends from claim 1 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 of the '212 Patent, claim 8 is not rendered obvious by Hashem '569 alone or in combination with Ritter. Further, as has been stated repeatedly throughout

my Report, Hashem '569 (and '129) teaches that a method for using all subcarriers for the one subscriber, meaning there is no need for or use of "additional information" in making a selection of which subcarriers to use. They are all used for the one subscriber. Fuja's citation to the passage from Hashem '129 speaks only to how Link Modes are evaluated and modified, not how, or even whether, that factors into which subcarriers are selected. And, for the same reasons stated several times above in my Report, one of ordinary skill in the art would not be motivated to combine the two incompatible systems of Hashem '569 and Ritter.

7. Claim 9 of the '212 Patent is not Rendered Obvious by Ritter in Combination with Hashem '569 or the Sollenberger Article and/or the IS-95A Standard

121. Claim 9 reads: "The method defined in claim 8 wherein the additional information comprises traffic load information on each cluster of subcarriers."

122. Claim 9 depends from claim 8 which depends from claim 1 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 and claim 8 of the '212 Patent, claim 9 is not rendered obvious by Ritter in combination with Hashem '569 or the Sollenberger Article or the IS-95A Standard, nor would one of ordinary skill in the art be motivated to combine such disparate references.

8. Claim 9 of the '212 Patent is not Rendered Obvious by the Sollenberger Publications

123. Claim 9 depends from claim 8 which depends from claim 1 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 and claim 8 of the '212 Patent, claim 9 is not

rendered obvious by the Sollenberger Publications, nor would one of ordinary skill in the art be motivated to combine such disparate references. Moreover, nothing in the Sollenberger Article—the only reference explicitly analyzed by Fuja here—discloses the use of traffic load information or the serving of multiple subscribers. In fact, Fuja's analysis requires multiple leaps of logic to arrive at his conclusion. First, because the Sollenberger Article does not explicitly disclose OFDMA, one must assume that one of ordinary skill would understand the Article to be addressing OFDMA. Then, because the Sollenberger article does not discuss traffic load information specifically either, one must further assume that one of ordinary skill would understand that a system employing OFDMA necessarily entails a base station selecting clusters of subcarriers based on traffic load information on each cluster. Fuja simply does not provide sufficient evidence to support such conclusions. Therefore, claim 9 is not rendered obvious by the Sollenberger Publications.

9. Claim 9 of the '212 Patent is not Rendered Obvious by Hashem '569 Alone or in Combination with Ritter

124. Claim 9 depends from claim 8 which depends from claim 1 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 and claim 8 of the '212 Patent, claim 9 is not rendered obvious by Hashem '569 alone or in combination with Ritter.

125. Fuja correctly admits that Hashem '569 does not disclose the limitations of claim 9. Additionally, I incorporate by reference my analysis of why one of ordinary skill in the art would not be motivated to combine Hashem '569 with

Ritter to meet the limitations of claim 9, such as the analysis set forth in claims 8 and 21 of the '748 Patent.

9. Claim 10 of the '212 Patent is not Rendered Obvious by Ritter in Combination with Hashem '569 or Sollenberger Article and/or the IS-95A Standard

126. Claim 10 depends indirectly from claim 1 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claims 1, 8, and 9 of the '212 Patent, claim 10 is not rendered obvious by Ritter in Combination with Hashem '569 or Sollenberger Article and/or the IS-95A.

127. Additionally, for the reasons set forth in my analysis of claim 25, claim 10 is not invalid.

10. Claim 10 of the '212 Patent is not Rendered Obvious by the Sollenberger Publications

128. Claim 10 depends indirectly from claim 1 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claims 1, 8, and 9 of the '212 Patent, claim 10 is not rendered obvious by the Sollenberger Publications.

129. Additionally, for the reasons set forth in my analysis of claim 25, claim 10 is not invalid.

11. Claim 10 of the '212 Patent is not Rendered Obvious by Hashem '569 in Combination with Ritter

130. Claim 10 depends indirectly from claim 1 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claims 1, 8, and 9 of the '212 Patent, claim 10 is not rendered obvious by Hashem '569 in combination with Ritter.

131. Additionally, for the reasons set forth in my analysis of claim 25, claim 10 is not invalid.

12. Claim 10 of the '212 Patent is not Rendered Obvious by the Project Angel System

132. Claim 10 depends indirectly from claim 1 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claims 1, 8, and 9 of the '212 Patent, claim 10 is not rendered obvious by the Project Angel system.

133. Additionally, for the reasons set forth in my analysis of claim 25, claim 10 is not invalid.

13. Claim 11 of the '212 Patent is not Rendered Obvious by Ritter in Combination with the Sollenberger Article and Ritter in Combination with IS-95A

134. Claim 11 depends directly from claim 1 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 of the '212 Patent, claim 11 is not rendered obvious by Ritter in combination with the Sollenberger Article and Ritter in combination with IS-95A.

135. Additionally, for the reasons set forth in my analysis of claim 26, claim 11 is not invalid.

14. Claim 11 of the '212 Patent is not Rendered Obvious by the Sollenberger Publications

136. Claim 11 depends directly from claim 1 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 of the '212 Patent, claim 11 is not rendered obvious by the Sollenberger Publications.

137. Additionally, for the reasons set forth in my analysis of claim 26, claim 11 is not invalid.

15. Claim 11 of the '212 Patent is not Rendered Obvious by Hashem '569 in Combination with Ritter

138. Claim 11 depends directly from claim 1 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 of the '212 Patent, claim 11 is not rendered obvious by Hashem '569 in combination with Ritter.

139. Additionally, for the reasons set forth in my analysis of claim 26, claim 11 is not invalid.

16. Claim 11 of the '212 Patent is not Anticipated or Rendered Obvious by the Project Angel System

140. Claim 11 depends directly from claim 1 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 of the '212 Patent, claim 11 is not anticipated or rendered obvious by the Project Angel system.

141. Additionally, for the reasons set forth in my analysis of claim 26, claim 11 is not invalid.

10. Claim 12 of the '212 Patent is not Rendered Obvious by Ritter in Combination with the Sollenberger Article and Ritter in Combination with the IS-95A Standard

142. Claim 12 depends from claim 1 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 of the '212 Patent, claim 12 is not rendered obvious by Ritter in

combination with the Sollenberger Article or Ritter in Combination with the IS-95A Standard.

11. Claim 12 of the '212 Patent is not Rendered Obvious by the Sollenberger Publications

143. Claim 12 depends from claim 1 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 of the '212 Patent, claim 12 is not rendered obvious by the Sollenberger Publications. Moreover, the Sollenberger Patent describes a system where the channel-scanning process stops immediately upon finding L acceptable channels. And because the system was designed so as to help the base station "learn" and favor the highest priority channels quicker, a person of ordinary skill in the art would not be motivated to draw out or otherwise lengthen this channel-scanning process simply for the sake of scanning all the subcarriers allocable by the base station. Therefore, the Sollenberger Patent neither discloses nor renders obvious this claim element.

12. Claim 12 of the '212 Patent is not Rendered Obvious by Hashem '569 in Combination with Ritter

144. Claim 12 reads: "The method defined in claim 1 wherein the plurality of subcarriers comprises all subcarriers allocable by a base station."

145. Claim 12 depends from claim 1 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 of the '212 Patent, claim 12 is not rendered obvious by Hashem in combination with Ritter.

13. Claim 13 of the ’212 Patent is not Rendered Obvious by Ritter in Combination with Hashem ’569 or the Sollenberger Article and/or IS95A

146. Claim 13 depends from claim 1 of the ‘212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 of the ‘212 Patent, claim 13 is not rendered obvious by Ritter in combination with the Sollenberger Article or Ritter in Combination with the IS-95A Standard.

14. Claim 13 of the ’212 Patent is not Rendered Obvious by the Sollenberger Publications

147. Claim 13 depends from claim 1 of the ‘212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 of the ‘212 Patent, claim 13 is not rendered obvious by the Sollenberger Publications.

15. Claim 13 of the ’212 Patent is not Rendered Obvious by Hashem ’569 Alone or in Combination with Ritter

148. Claim 13 depends from claim 1 of the ‘212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 of the ‘212 Patent, claim 13 is not rendered obvious by Hashem ‘569 alone or in combination with Ritter.

16. Claim 15 of the ‘212 Patent is not Rendered Obvious by Ritter in Combination with Hashem ‘569

149. Claim 15 depends from claim 1 of the ‘212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 of the ‘212 Patent, claim 15 is not rendered obvious by Ritter in combination with Hashem ‘569.

150. Fuja notes that Ritter does not disclose this limitation. And he is incorrect that one of ordinary skill would look to combine Ritter with Hashem '569 for this limitation. First, Fuja is incorrect in referring to Hashem '569 as disclosing an OFDMA system. My analysis for the preamble of claim 8 of the '748 Patent, which I incorporate here by reference, demonstrates why Fuja is incorrect. And for the reasons set forth in my introduction to claim 8, it would not be obvious to one of ordinary skill in the art to combine Hashem '569 with Ritter.

17. Claim 15 of the '212 Patent is not Rendered Obvious by the Sollenberger Publications

151. Claim 15 depends from claim 1 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 of the '212 Patent, claim 15 is not rendered obvious by the Sollenberger Publications.

152. The Sollenberger Patent does not teach OFDMA, and therefore does not teach clusters of subcarriers. Moreover, it teaches away from clustering by providing feedback on individual channels. Finally, the Sollenberger Patent teaches away from sequential feedback, which avoids the need for a channel identifier, by only identifying a subset of channels.

153. Additionally, Fuja is incorrect when he states that this limitation is rendered obvious by the Sollenberger Article. Nowhere in the Sollenberger Article is the order of feedback referenced. In fact, nothing about the contents of the feedback is disclosed beyond the use of the undefined term "potential transmission quality." Without even knowing what the "short report" from the terminal to the base station in the Sollenberger Article consists of, it would not be

obvious to a person of ordinary skill in the art that this "short report" would somehow be sequentially ordered. Moreover, Fuja fails to explain what it is that would be sequentially ordered. This is important because the approach of the Sollenberger Article to use radio resources associated with a frequency hopping pattern. It is unclear from Fuja's report how one would order such frequent hopping patterns given that they entail transmissions that jump all over in terms of frequency. So one of ordinary skill would be left wondering what exactly is to be sequentially ordered.

18. Claim 15 of the '212 Patent is not Rendered Obvious by Hashem '569 Alone or in Combination with Ritter

154. Claim 15 depends from claim 1 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 of the '212 Patent, claim 15 is not rendered obvious by Hashem '569 in combination with Ritter.

155. By teaching an approach where feedback is only provided on a subset of channels (segments), Ritter teaches away from providing sequential feedback. Moreover, the feedback is numbered according to priority, and thus is not ordered sequentially.

19. Claim 16 of the '212 Patent is not Rendered Obvious by Ritter in Combination with Hashem '569 or the Sollenberger Article or the IS-95A Standard

156. Claim 16 reads: "The method defined in claim 1 further comprising: the base station allocating a first portion of the subcarriers to establish a data link between the base station and the subscriber unit."

157. Claim 16 depends from claim 1 of the ‘212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 of the ‘212 Patent, claim 16 is not rendered obvious by Hashem ‘569 in combination with Ritter.

20. Claim 16 of the ‘212 Patent is not Rendered Obvious by the Sollenberger Publications

158. Claim 16 depends from claim 1 of the ‘212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 of the ‘212 Patent, claim 16 is not rendered obvious by the Sollenberger Publications.

21. Claim 16 of the ‘212 Patent is not Rendered Obvious by Hashem ‘569 Alone or in Combination with Ritter

159. Claim 16 depends from claim 1 of the ‘212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 of the ‘212 Patent, claim 16 is not rendered obvious by Hashem ‘569 alone or in combination with Ritter.

22. Claim 18 of the ‘212 Patent is not Rendered Obvious by Ritter in Combination with Hashem ‘569 or the Sollenberger Article and/or the IS-95A Standard

160. The following analysis demonstrates that claim 18 of the ‘212 Patent is not rendered obvious by Ritter in combination with Hashem ‘569 or the Sollenberger Article or the IS-95A Standard.

Element 18[c][2] – “based on pilot symbols received from the first base station.”

161. For the reasons set forth above with respect to claim element 21of the ‘748 Patent and element 1 of the ‘212 Patent, claim element 18[c][2] of the ‘212 Patent is not rendered obvious by Ritter in combination with Hashem ‘569 or the Sollenberger Article or the IS-95A Standard.

Element 18[c][6] – “wherein the subscriber unit submits updated feedback information after being allocated the set of subscriber units to receive an updated set of subcarriers.”

162. For the reasons set forth above with respect to claim element 1 of the ‘212 Patent, claim element 18[c][6] of the ‘212 Patent is not rendered obvious by Ritter in combination with Hashem ‘569 or the Sollenberger Article or the IS-95A Standard.

Element 18[c][6] – “wherein the subscriber unit submits updated feedback information after being allocated the set of subscriber units to receive an updated set of subcarriers.”

163. For the reasons set forth above with respect to claim element 1 of the ‘212 Patent, claim element 18[c][7] of the ‘212 Patent is not rendered obvious by Ritter in combination with Hashem ‘569 or the Sollenberger Article or the IS-95A Standard.

23. Claim 18 of the ‘212 Patent is not Rendered Obvious by the Sollenberger Publications

164. The following analysis demonstrates claim 18 of the ‘212 Patent is not rendered obvious by the Sollenberger Publications. I hereby incorporate by reference my analysis of the Asserted Claims of the ‘748 Patent as to why one of ordinary skill in the art would not be motivated to combine the Sollenberger Patent with the Sollenberger Article.

Element 18[c][3] – "at least one of the plurality of subscriber units to select a set of candidate subcarriers from the plurality of subcarriers."

165. For the reasons set forth above with respect to claim element 1 of the '212 Patent, claim element 18[c][3] of the '212 Patent is not rendered obvious by the Sollenberger Publications.

Element 18[c][4] – "said at least one subscriber unit provide feedback information on the set of candidate subcarriers to the base station."

166. For the reasons set forth above with respect to claim element 1 of the '212 Patent, claim element 18[c][4] of the '212 Patent is not rendered obvious by the Sollenberger Publications.

24. Claim 18 of the '212 Patent is not Rendered Obvious by Hashem '569 Alone or in Combination with Ritter

167. The following analysis demonstrates claim 18 of the '212 Patent is not rendered obvious by the Hashem '569 alone or in combination with Ritter. I incorporate by reference my analysis in the introduction to Claim 8 of the '748, above, regarding Hashem alone, as well as the combination of Ritter and Hashem '569. I also incorporate by reference my analysis of the preamble to claim 8.

Element 18[a] – "a plurality of subscriber units in a first cell to generate feedback information indicating clusters of subcarriers desired for use by the plurality of subscriber units."

168. Hashem '569 does not disclose this element and does not render it obvious, nor does Hashem '569 in combination with Ritter. Because Hashem is not concerned with a multi-user system, such as OFDMA, he is not concerned with multiple subscriber units. I hereby incorporate by reference my analysis set forth above for element 21 of the '748 Patent.

Element 18[b] – "a first base station in the first cell, the first base station operable to allocate OFDMA subcarriers in clusters to the plurality of subscriber units."

169. For the reasons set forth above in claim element 21, Hashem '569 alone does not disclose or render obvious this element, nor does Hashem '569 in combination with Ritter render obvious this element. I incorporate by reference my analysis in the introduction to Claim 8, above, regarding the combination of Ritter and Hashem '569, as well as my analysis of the preamble to claim 8.

Element 18[c][2] – "based on pilot symbols received from the first base station."

170. For the reasons set forth above in claim 21 of the '748 Patent, including with respect to Ritter in combination with Hashem '569 or the Sollenberger Article or the IS-95A Standard, Hashem '569 alone does not disclose or render obvious this element, nor does Hashem '569 in combination with Ritter render obvious this element. I incorporate by reference my analysis in the introduction to Claim 8, above, regarding the combination of Ritter and Hashem '569, as well as my analysis of the preamble to claim 8 of the '748 Patent.

Element 18[c][5] – "receive an indication of subcarriers from the set of subcarriers selected by the first base station for use by the at least one subscriber unit."

171. For the reasons set forth above in claim 21, including with respect to Ritter in combination with Hashem '569 or the Sollenberger Article or the IS-95A Standard, as well as my analysis for element 1[d] of the '212 Patent, Hashem '569 alone does not disclose or render obvious this element, nor does Hashem '569 in combination with Ritter render obvious this element. I incorporate by reference

my analysis in the introduction to claim 8, as well as my analysis of the preamble to claim 8 and claim element 8[e] of the '748 Patent.

Element 18[c][7] – "receives another indication of the updated set of subcarriers."

172. My analysis for claim 8 of the '748 Patent, particularly claim element 8[e], demonstrates why this claim is not rendered obvious by Hashem '569 alone or in combination with Ritter. I also hereby incorporate my discussions above regarding why one of ordinary skill would not combine Hashem '569 with Ritter, and which demonstrates why this claim element is not rendered obvious.

19. Claim 19 of the '212 Patent is not Rendered Obvious by Ritter in Combination with Hashem '569 or the Sollenberger Article or the IS-95A Standard

173. Claim 19 reads: "The apparatus defined in claim 18 wherein each of the plurality of subscriber units continuously monitors reception of the pilot symbols known to the base station and the plurality of subscriber units and measure signal-plus-interference-to-noise ratio (SINR) of each cluster of subcarriers."

174. Claim 19 depends from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, claim 19 is not rendered obvious by Ritter in combination with Hashem '569 or the Sollenberger Article or the IS-95A Standard.

20. Claim 19 of the '212 Patent is not Rendered Obvious by the Sollenberger Publications

175. Claim 19 depends from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to

claim 18 of the ‘212 Patent, claim 19 is not rendered obvious by the Sollenberger Publications.

21. Claim 19 of the ‘212 Patent is not Rendered Obvious by Hashem ‘569 Alone or in Combination with Ritter

176. Claim 19 depends from claim 18 of the ‘212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the ‘212 Patent, claim 19 is not rendered obvious by Hashem alone or in combination with Ritter.

21. Claim 19 of the ‘212 Patent is not Rendered Obvious by Project Angel

177. Claim 19 reads: “The apparatus defined in claim 18 wherein each of the plurality of subscriber units continuously monitors reception of the pilot symbols known to the base station and the plurality of subscriber units and measure signal-plus-interference-to-noise ratio (SINR) of each cluster of subcarriers.”

178. Claim 19 depends from claim 18 of the ‘212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the ‘212 Patent, claim 19 is not rendered obvious by Project Angel.

22. Claim 20 of the ‘212 Patent is not Rendered Obvious by Ritter in Combination with Hashem ‘569 or the Sollenberger Article and/or the IS-95A Standard

179. Claim 20 depends from claim 18 of the ‘212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the ‘212 Patent, claim 20 is not rendered obvious by Ritter in Combination with Hashem ‘569 or the Sollenberger Article and/or the IS-95A Standard.

22. Claim 20 of the ‘212 Patent is not Rendered Obvious by the Sollenberger Publications

180. Claim 20 depends from claim 18 of the ‘212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the ‘212 Patent, claim 20 is not rendered obvious by the Sollenberger Publications.

22. Claim 20 of the ‘212 Patent is not Rendered Obvious by Hashem ‘569 Alone or in Combination with Ritter

181. Claim 20 depends from claim 18 of the ‘212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the ‘212 Patent, claim 20 is not rendered obvious by Hashem ‘569 alone or in combination with Ritter.

22. Claim 20 of the ‘212 Patent is not Rendered Obvious by the Project Angel System

182. Claim 20 depends from claim 18 of the ‘212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the ‘212 Patent, claim 20 is not rendered obvious by the Project Angel System.

22. Claim 21 of the ‘212 Patent is not Rendered Obvious by Ritter in Combination with Hashem ‘569 or the Sollenberger Article and/or the IS-95A Standard, and Alternatively in Combination with Haartsen ‘837 or Liu ‘315

183. Claim 21 depends indirectly from claim 18 of the ‘212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the ‘212 Patent, claim 21 is not rendered obvious by Hashem ‘569 alone or in combination with Ritter.

22. Claim 21 of the ‘212 Patent is not Rendered Obvious by the Sollenberger Publications, and Alternatively in Combination with Haartsen ‘837 or Liu ‘315

184. Claim 21 depends indirectly from claim 18 of the ‘212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the ‘212 Patent, claim 21 is not rendered obvious by Sollenberger Publications, and Alternatively in Combination with Haartsen ‘837 or Liu ‘315.

22. Claim 21 of the ‘212 Patent is not Rendered Obvious by Hashem ‘569 Alone or in Combination with Ritter, and Alternatively in Combination with Haartsen ‘837 or Liu ‘315

185. Claim 21 depends indirectly from claim 18 of the ‘212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the ‘212 Patent, claim 21 is not rendered obvious by Hashem ‘569 Alone or in Combination with Ritter, and Alternatively in Combination with Haartsen ‘837 or Liu ‘315.

22. Claim 21 of the ‘212 Patent is not Rendered Obvious by the Project Angel System, and Alternatively in Combination with Haartsen ‘837 or Liu ‘315

186. Claim 21 depends indirectly from claim 18 of the ‘212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the ‘212 Patent, claim 21 is not rendered obvious by the Project Angel System, and Alternatively in Combination with Haartsen ‘837 or Liu ‘315.

22. Claim 23 of the ‘212 Patent is not Rendered Obvious by Ritter in Combination with Hashem ‘569 or the Sollenberger Article and/or the IS-95A Standard

187. Claim 23 reads: "The apparatus defined in claim 18 wherein the base station selects the subcarriers from the set of candidate subcarriers based on additional information available to the base station."

188. Claim 23 depends from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, claim 23 is not rendered obvious by Ritter in combination with Hashem '569 or the Sollenberger Article and/or the IS-95A Standard. I also incorporate by reference my analysis of claim 8 of the '212 Patent.

29. Claim 23 of the '212 Patent is not Rendered Obvious by the Sollenberger Publications

189. Claim 23 depends from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, claim 23 is not rendered obvious by the Sollenberger Publications. I also incorporate by reference my analysis of claim 8 of the '212 Patent.

30. Claim 23 of the '212 Patent is not Rendered Obvious by Hashem '569 Alone or in Combination with Ritter

190. Claim 23 depends from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, claim 23 is not rendered obvious by Hashem '569 alone or in combination with Ritter. I also incorporate by reference my analysis of claim 8 of the '212 Patent.

31. Claim 24 of the '212 Patent is not Rendered Obvious by Ritter in Combination with Hashem '569 or the Sollenberger Article and/or the IS-95A Standard

191. Claim 24 reads: "The apparatus defined in claim 23 wherein the additional information comprises traffic load information on each cluster of subcarriers."

192. Claim 24 depends indirectly from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, claim 24 is not rendered obvious by Ritter in combination with Hashem '569 or the Sollenberger Article and/or the IS-95A Standard. I also incorporate by reference my analysis of claim 9 of the '212 Patent.

32. Claim 24 of the '212 Patent is not Rendered Obvious by the Sollenberger Publications

193. Claim 24 depends indirectly from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, claim 24 is not rendered obvious by the Sollenberger Publications. I also incorporate by reference my analysis of claim 9 of the '212 Patent.

33. Claim 24 of the '212 Patent is not Rendered Obvious by Hashem '569 Alone or in Combination with Ritter

194. Claim 24 depends indirectly from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, claim 24 is not rendered obvious by Hashem '569

alone or in combination with Ritter. I also incorporate by reference my analysis of claim 9 of the '212 Patent.

34. Claim 25 of the '212 Patent is not Rendered Obvious by Ritter in Combination with Hashem '569 or the Sollenberger Article and/or the IS-95A Standard

195. Claim 25 reads: "The apparatus defined in claim 24 wherein the traffic load information is provided by a data buffer in the base station."

196. Claim 25 depends indirectly from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, claim 25 is not rendered obvious by Ritter in combination with Hashem '569 the Sollenberger Article and/or the IS-95A Standard.

35. Claim 25 of the '212 Patent is not Rendered Obvious by the Sollenberger Publications

197. Claim 25 depends indirectly claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, claim 25 is not rendered obvious by the Sollenberger Publications.

36. Claim 25 of the '212 Patent is not Rendered Obvious by Hashem '569 Alone or in Combination with Ritter

198. Claim 25 depends indirectly from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, claim 25 is not rendered obvious by Hashem '569 alone or in combination with Ritter.

37. Claim 26 of the '212 Patent is not Rendered Obvious by Ritter in Combination with Hashem '569 or the Sollenberger Article and/or the IS-95A Standard

199. Claim 26 reads: "The apparatus defined in claim 18 wherein the indication of subcarriers is received via a downlink control channel between the base station and the at least one subscriber unit."

200. Claim 26 depends from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, claim 26 is not rendered obvious by Hashem '569 alone or in combination with Ritter.

38. Claim 26 of the '212 Patent is not Rendered Obvious by the Sollenberger Publications

201. Claim 24 depends from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, claim 26 is not rendered obvious by Hashem '569 alone or in combination with Ritter.

39. Claim 26 of the '212 Patent is not Rendered Obvious by Hashem '569 Alone or in Combination with Ritter

202. Claim 26 depends from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, claim 26 is not rendered obvious by Hashem '569 alone or in combination with Ritter.

40. Claim 28 of the '212 Patent is not Rendered Obvious by Ritter in Combination with Hashem '569 or the Sollenberger Article or the IS-95A Standard

203. Claim 28 reads: "The apparatus defined in claim 18 wherein the plurality of subscriber units provide feedback information that comprises an arbitrarily ordered set of candidate subcarriers as clusters of subcarriers."

204. Claim 28 depends from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, claim 28 is not rendered obvious by Ritter in combination with Hashem '569 or the Sollenberger Article or the IS-95A Standard.

41. Claim 28 of the '212 Patent is not Rendered Obvious by the Sollenberger Publications

205. Claim 28 depends from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, claim 28 is not rendered obvious by the Sollenberger Publications.

42. Claim 28 of the '212 Patent is not Rendered Obvious by Hashem '569 Alone or in Combination with Ritter

206. Claim 28 depends from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, claim 28 is not rendered obvious by Hashem '569 alone or in combination with Ritter.

43. Claim 29 of the '212 Patent is not Rendered Obvious by Ritter in Combination with Hashem '569 or the Sollenberger Article or the IS-95A Standard

207. Claim 29 reads: "The apparatus defined in claim 18 wherein providing feedback information comprises sequentially ordering candidate clusters."

208. Claim 29 depends from claim 18 of the ‘212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the ‘212 Patent, as well as claim 12 of the ‘212 Patent, claim 29 is not rendered obvious by Ritter in combination with Hashem ‘569 or the Sollenberger Article or the IS-95A Standard.

44. Claim 29 of the ‘212 Patent is not Rendered Obvious by the Sollenberger Publications

209. Claim 29 depends from claim 18 of the ‘212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the ‘212 Patent, as well as claim 12 of the ‘212 Patent, claim 29 is not rendered obvious by the Sollenberger Publications.

45. Claim 29 of the ‘212 Patent is not Rendered Obvious by Hashem ‘569 Alone or in Combination with Ritter

210. Claim 29 depends from claim 18 of the ‘212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the ‘212 Patent, as well as claim 12 of the ‘212 Patent, claim 29 is not rendered obvious by Hashem ‘569 alone or in combination with Ritter.

46. Claim 30 of the ‘212 Patent is not Rendered Obvious by Ritter in Combination with Hashem ‘569 or the Sollenberger Article or the IS-95A Standard

211. Claim 30 reads: “The apparatus defined in claim 18 wherein the base station allocates a first portion of the subcarriers to establish a data link between the base station and the subscriber unit; and then allocates a second portion of the subcarriers to the subscriber unit to increase communication bandwidth.”

212. Claim 30 depends from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, claim 30 is not rendered obvious by Ritter in combination with Hashem '569 or the Sollenberger Article or the IS-95A Standard.

47. Claim 30 of the '212 Patent is not Rendered Obvious by the Sollenberger Publications

213. Claim 30 depends from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, claim 30 is not rendered obvious by the Sollenberger Publications.

48. Claim 30 of the '212 Patent is not Rendered Obvious by Hashem '569 Alone or in Combination with Ritter

214. Claim 30 depends from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, claim 30 is not rendered obvious by Hashem '569 alone or in combination with Ritter.

C. PROJECT ANGEL[2]

1. Background

215. I understand that with respect to claims that any given activity (as opposed to a patent or publication) constitutes prior art to the patents in suit, Defendants have the burden of proving, by clear and convincing evidence, a date for the

[2] Throughout this report, unless otherwise noted, my explanations for why one of ordinary skill in the art would not be motivated to combine references and why any such asserted combinations would not have been obvious apply equally throughout the claims analyzed.

activity (e.g., sale of a product) before the critical date (December 15, 1999) or, for the defense of public use or prior invention, a date before the date of invention by the patentees (which would be December 15, 2000, or perhaps earlier).

216. I also understand that the Defendants have the burden of proving, by clear and convincing evidence, all of the technical details necessary to establish that the activity (such as a public disclosure) on or before that date meets the limitations of the patent claims.

217. Fuja does not claim to have had any personal knowledge of what he refers to generically as the "Project Angel system," or simply "Project Angel." Rather, he seems to be interpreting documents and deposition testimony that he only recently received. I also understand that a majority of Fuja's reliance that the functionalities discussed in the documents were implemented in the "Project Angel system" was based on [redacted] I understand that, [redacted]

218. Fuja states that [redacted], I reviewed

the documents that he cited in his report to determine whether they were sufficient to themselves show what prior art activity actually occurred before the above dates or to corroborate testimony as to such activity having actually occurred.

219. He relies on a document, [redacted]

220. He also relies on a draft, [redacted]

221. Based on his reading of those documents, Fuja states that the [redacted]

[redacted]

222. Fuja states that the [redacted]

[redacted]

223. Fuja states that the [redacted]

[redacted]

224. Fuja states that the [redacted]

[redacted]

[redacted]

225. Thus it appears that Fuja has not presented clear and convincing evidence that [redacted].

226. I understand that at trial there will be considerable evidence that the Project Angel system, in whatever form [redacted]

227. I understand that at trial there will be considerable evidence that the [redacted]

228. I understand that there are weaknesses in the oral testimony upon which Defendants intend to rely to prove that Project Angel was prior art and the technical details of the system.

229. I understand that the evidence that Defendants and Fuja have cited fail to meet the legal requirements to prove prior art.

230. The bases for the above understandings are contained in the document attached as Exhibit B to this report.

231. In any event, I understand that what Fuja specifically argues is prior art is [redacted] Again, much of his description, for the reasons mentioned earlier, may not meet the required evidentiary and other legal standards.

232. I will now discuss, on a claim-by-claim basis, the opinions that Fuja gives with respect to Project Angel.

2. Claim 6, '748 Patent

233. For the reasons set forth below with respect to claims 8 and 21, claim 6 is not anticipated or rendered obvious by the Project Angel System.

3. Claim 8, '748 Patent

Claim Element 8[Pre]

234. The preamble states **"**system ***employing orthogonal frequency division multiple access (OFDMA)."*** The documentary evidence cited in Fuja's report,

along with Fuja's opinions, do not prove that [redacted]

235. His first citation states:

[redacted] therefore, it provides [redacted] of "a system employing orthogonal frequency division multiple access (OFDMA)."

236. His second citation states:

[redacted]. Consequently, it provides [redacted] that Project Angel discloses "a system employing orthogonal frequency division multiple access (OFDMA)."

237. His third citation states:

[redacted]

[redacted] As a result, it provides [redacted] of "a system employing orthogonal frequency division multiple access (OFDMA)."

238. His fourth citation states:

[redacted] Consequently, it provides [redacted] that Project Angel is "a system employing orthogonal frequency division multiple access (OFDMA)."

239. His ***fifth citation*** is a string citation to [redacted]

[redacted] Both provide [redacted] that Project Angel discloses OFDMA.

240. In sum, the documentary evidence provides [redacted] that Project Angel was a ***"system employing orthogonal frequency division multiple access (OFDMA)."***.

Claim Element 8[a]

241. Claim element 8[a] states: "**a subscriber measuring channel and interference information for a plurality of subcarriers based on pilot symbols received from the base station…**" The documentary evidence cited in Fuja's report, along with Fuja's opinions, do not prove that Project Angel [redacted] disclosed or rendered obvious this claim element.

242. [redacted] Fuja then provides an [redacted] but provides no evidence that Project Angel [redacted]

243. [redacted] Again, Fuja then provides an [redacted] and describes a [redacted] In both cases, he provides no evidence that Project Angel used [redacted]

244. Similarly, Fuja provides no evidence tying the documentation to Project Angel[redacted].

245. Fuja mistakenly states that[redacted].

246. Although some of the documentation discloses[redacted]

247. His citation from[redacted]

248. [redacted]

249. Fuja cites to a passage about[redacted]

[redacted] There is no evidence that this [redacted] was ever actually implemented in the Project Angel system [redacted]

250. Fuja's statement that [redacted]

251. Finally, the [redacted]

252. Thus, Fuja provides no evidence that the Project Angel system [redacted] discloses this claim element. Nor does he provide evidence to support his conclusory statement that it would have been obvious to use pilot signals.

Claim Element 8[d]

253. Claim element 8[d] of the '748 patent reads: **"the subscriber sending an indication of coding and modulation rates that the subscriber desires to employ for each cluster."** The documentary evidence cited in Fuja's report, along with Fuja's opinions, do not prove that Project Angel [redacted] combined with Hashem '569 rendered obvious this claim.

254. Fuja states that the Project Angel system explicitly provided for [redacted] and that a person of ordinary skill would have been motivated to "combine" the Project Angel system with Hashem '569 for purposes of claim element 8[d].

255. Fuja provides no evidence, however, to support his conclusory statement that it would have been obvious to a person of ordinary skill to combine the Project Angel system with Hashem '569.

256. It would not have been obvious to a person of ordinary skill in the art to combine Hashem '569 with the Project Angel system. The Project Angel system was a [redacted]

[redacted]

257. Hashem '129, which Fuja states is incorporated by reference in Hashem '569, illustrates this point. In describing how the claimed method for signaling Link Modes would operate in the context of low mobility systems, Hashem '129 notes that in such low mobility systems, "the channel quality will vary slowly" and there will typically only be minor changes in the appropriate Link Mode, or modulation scheme. *See* '129 Patent at 4:63-67. Thus, in a low mobility system, there will typically be a reduced need for dynamically adapting the coding and modulation rate. It follows that in a system with zero mobility—[redacted]—there would be even less of a need for subscriber feedback regarding coding and modulation rates, if any need at all.

258. The Project Angel system's [redacted]

259. [redacted]

Project Angel system would not have been obvious to a person of ordinary skill in the art.

260. Additionally, one of ordinary skill in the art would understand that Hashem's bitmask feedback approach was designed to reduce overhead, as it contains only one bit to indicate whether the corresponding subcarrier is acceptable and the desired coding and modulation rate for that subcarrier. On the other hand, the Project Angel system [redacted] This consumes more overhead than Hashem's bitmask approach and causes the very problem Hashem's approach was designed to avoid. Therefore, one of ordinary skill in the art would not have been motived to combine the two references.

261. A great deal of attention is paid by the Project Angel documents cited by Dr. Fuja to Project Angel's [redacted].

262. To the extent that Project Angel [redacted] then this is a further deterrent to combining it with Hashem '569. Fuja is incorrect when he states that Hashem '569 addressed, designed, or was otherwise aimed at an OFDMA system. It was not. Hashem teaches ways to use all subcarriers for transmission to a single user at a time, even those that are considered

unacceptable, such as by transmitting lower priority traffic on them or borrowing their power to use for transmission on the better subcarriers. This shows that Hashem did not appreciate the particular nature of the wireless channel in a multi-user mobile network were what is bad for one user can be good for another, given their different locations with respect to the base station. Therefore, one of ordinary skill would not combine these two references, because it would require improperly picking and choosing bits and pieces from each of these very different systems, and ignoring contrary teachings in each.

4. Claim 9, '748 Patent

263. Claim 9 of the '748 patent reads: **"wherein the indication of coding and modulation rates comprises an SINR index indicative of a coding and modulation rate."** The documentary evidence cited in Fuja's report, along with Fuja's opinions, do not prove that Project Angel [redacted] in combination with Hashem '569 renders this claim obvious.

264. Fuja states that the Project Angel system, in combination with Hashem '569, renders obvious claim 9 of the '748 Patent.

265. For the reasons discussed below, and in the section on claim 8[d] of the '748, the Project Angel system, in combination with Hashem '569, does not render claim 9 of the '748 Patent obvious.

266. Fuja's first citation is to [redacted]

[redacted]

267. More generally, however, there would be no need or motivation for one of ordinary skill in the art to incorporate Hashem '569 (and '129) into the Project Angel system. Hashem '569 and '129 provide a method for adapting modulation schemes to changing channel quality. Hashem '129 also points out that, even in a mobile wireless system, when mobility is low, channel quality will vary slowly and any change in the desired Link Mode will be small. See '129 Patent at 4:63-67. The Project Angel system is [redacted] Thus, a person of ordinary skill in the art would not be motivated to incorporate Hashem '569 into the Project Angel system.

268. Additionally, one of ordinary skill in the art would understand that Hashem's bitmask feedback approach was designed to reduce overhead, as it contains only one bit to indicate whether the corresponding subcarrier is acceptable and the desired coding and modulation rate for that subcarrier. On the other hand, the Project Angel system allegedly provides [redacted] This consumes more overhead than Hashem's bitmask approach and causes the very problem Hashem's approach was designed

to avoid. Therefore, one of ordinary skill in the art would not have been motived to combine the two references.

5. Claim 11, '748 Patent

269. The documentary evidence cited in Fuja's report, along with Fuja's opinions, do not prove that Project Angel [redacted] implemented the elements and limitations of this claim, and fail to prove that the Project Angel system [redacted] alone or in combination with Haartsen '837 or Liu '315, renders this claim obvious.

270. Project Angel does not disclose a [redacted] And one of ordinary skill would not look to Haartsen or Liu '315 to combine with Project Angel. Haartsen is not an OFDMA system, but rather a TDMA system. It would be necessary make additional modifications, not adequately addressed by Fuja, to Project Angel in order to incorporate the inter-cell features of Haartsen. Liu '315 provides no teaching that would motivate one of ordinary skill in the art to modify the Project Angel system to include this element. Therefore, it would not have been obvious to so modify the Project Angel system – in view of either the Haartsen '837 or Liu '315 patents, as asserted by Fuja.

6. Claim 19, '748 Patent

271. For the reasons set forth herein with respect to claims 8 and 21, claim 19 is not anticipated or rendered obvious by the Project Angel System.

7. Claim 20, '748 Patent

272. For the reasons set forth herein with respect to claims 8, 2, 21 and 22, claim 20 is not rendered obvious by the Project Angel System alone or in combination with Hashem '569.

8. Claim 21, '748 Patent

Element 21[c][2]

273. Claim Element 21[c][2] of the '748 Patent reads: "based on pilot symbols received from the first base station."

274. My analysis set forth above for claim 8[a] of the '748 Patent, which is incorporated herein by reference, demonstrates that the Project Angel system, even if combined with Hashem '569, does not meet the limitations of this claim element or render this claim obvious.

Element 21[c][6]

275. Claim Element 21[c][6] of the '748 Patent reads: "wherein the one subscriber sends an indication of coding and modulation rates that the one subscriber desires to employ."

276. My analysis set forth above for claim 8[d] of the '748 Patent, which is incorporated herein by reference, demonstrates that the Project Angel system, even if combined with Hashem '569, does not meet the limitations of this claim element or render this claim obvious.

9. Claim 22, '748 Patent

277. Claim 22 of the '748 patent reads: "**The apparatus defined in claim 21 wherein the indication of coding and modulation rates comprises an SINR index indicative of a coding and modulation rate.**" The documentary evidence

cited in Fuja's report, along with Fuja's opinions, do not prove that Project Angel [redacted], in combination with Hashem '569, renders obvious this claim.

278. As discussed in the section above regarding claim 9 of the '748 patent, as well as the section on claim 8[d] of the '748 Patent, the Project Angel System, in combination with Hashem '569, does not render claim 22 of the '748 Patent obvious.

10. <u>Claim 1, '212 Patent</u>

Claim Element 1[a][2]

279. Claim element 1[a][2] of the '212 patent states: "based on pilot symbols received from a base station." The documentary evidence cited in Fuja's report, along with Fuja's opinions, do not prove that Project Angel [redacted] disclosed or rendered obvious this claim element.

280. My analysis set forth above for claim 8[a] of the '748 Patent, which is incorporated herein by reference, demonstrates that the Project Angel system does not meet the limitations of this claim element or render this claim element obvious.

Claim Element 1[e][1]

281. Claim element 1[e][1] of the '212 patent states "the subscriber unit submitting updated feedback information after being allocated the set of subcarriers to be allocated an updated set of subcarriers, and thereafter" The documentary evidence cited in Fuja's report, along with Fuja's opinions, do not prove that Project Angel [redacted] disclosed or rendered obvious this claim element.

282. Fuja cites to the [redacted] discussed in the [redacted]

[redacted]

283. As a general matter, the [redacted] This is fundamentally different from the updated feedback approach of claim 1 of the '212 Patent, which is carried out as a matter of course. This updating of feedback and allocations is necessary for the OFDMA subcarrier selection method in the '212 Patent, because it is used in a mobile, packet-switched system where resources need to assigned on an ongoing basis—each TTI—to deliver packets of data to the user.

284. The Project Angel system discloses [redacted]

[redacted]

285. According to the [redacted]

Claim Element 1[e][2]

286. Claim element 1[e][2] of the '212 patent states: "**the subscriber unit receiving another indication of the updated set of subcarriers.**" The documentary evidence cited in Fuja's report, along with Fuja's opinions, do not prove that Project Angel [redacted] disclosed or rendered obvious this claim

element. I hereby incorporate by reference my analysis set forth in claim element 1[e][1]. That analysis explains that the Project Angel system's [redacted] which is fundamentally different from the mobile, packet-switched OFDMA system described by the '212 Patent.

11. Claim 8, '212 Patent

287. Claim 8 of the '212 patent states: "**The method defined in claim 1 further comprising the base station selecting the subcarriers from the set of candidate subcarriers based on additional information available to the base station.**" The documentary evidence cited in Fuja's report, along with Fuja's opinions, do not prove that Project Angel [redacted] disclosed or rendered obvious this claim.

288. Fuja alleges that [redacted]

[redacted]

289. [redacted]

290. Finally, Fuja provides no evidence to support his conclusory statement that it would have been obvious to a person of ordinary skill in the art [redacted]

12. Claim 9, '212 Patent

291. Claim 9 of the '212 patent states: "The method defined in claim 8 wherein the additional information comprises traffic load information on each cluster of subcarriers." The documentary evidence cited in Fuja's report, along with Fuja's opinions, do not prove that Project Angel [redacted] disclosed or rendered obvious this claim.

292. My analysis set forth above for claim 8 of the '212 Patent, which is incorporated herein by reference, demonstrates that the Project Angel system does not disclose or meet the limitations of this claim or render this claim obvious.

293. Fuja asserts that the [redacted]

294. Fuja then contends that this is evidence that the [redacted]

295. Further, Fuja provides no evidence that whether a [redacted]

296. Fuja provides no evidence as to clusters. He states only that the Project Angel documentation discloses [redacted]

297. Fuja also relies on [redacted], but makes no mention [redacted]

298. Fuja also relies on a citation from [redacted] As a result, it provides no support.

13. <u>Claim 12, '212 Patent</u>

299. Claim 12 of the '212 patent states: "The method defined in claim 1 wherein the plurality of subcarriers comprises all subcarriers allocable by the base station." The documentary evidence cited in Fuja's report, along with Fuja's opinions, do not prove that Project Angel [redacted] disclosed or rendered obvious this claim.

300. Fuja overlooks that Project Angel [redacted] As a result, dependent claim 12 is neither disclosed nor rendered obvious by Project Angel.

14. Claim 13, '212 Patent

301. Claim 13 depends from claim 1 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 of the '212 Patent, claim 13 is not anticipated and/or rendered obvious by the Project Angel system.

15. Claim 15, '212 Patent

302. Claim 15 of the '212 patent reads: "The method defined in claim 1 wherein providing feedback information comprises sequentially ordering candidate clusters." The documentary evidence cited in Fuja's report, along with Fuja's opinions, does not prove that Project Angel [redacted] in combination with Hashem '569 rendered obvious this claim.

303. Fuja listed the heading for Part D of his analysis of the '212 Patent as "Claim 15 of the '212 Patent is Rendered Obvious by the Project Angel System." Within Part D, Fuja then asserts that "Claim 15, including the 'sequentially ordering' limitation, is rendered obvious by the Project Angel System." In the next sentence, Fuja states, "The Project Angel system does not disclose this limitation." Fuja, however, does not provide any evidence to support his opinion of obviousness based on Project Angel alone.

304. Fuja then continues with what appears to be an obviousness analysis using a combination of the Project Angel System and the Hashem '569 patent.

305. Fuja states that Hashem '569 discloses "an OFDMA system in which feedback for groups of subcarriers are reported back to the base station in sequential order (e.g., by ascending frequency)." First, Fuja misrepresents Hashem '569 by describing it as "an OFDMA system." Nowhere in Hashem '569 is OFDMA mentioned. Hashem '569 describes an OFDM system, where the remote unit provides feedback indicating, for all subcarriers or all groups of subcarriers, whether each is acceptable or unacceptable.

306. Hashem '569 further explains that even subcarriers (or subbands) that the remote unit indicates are unacceptable may still be used in some way for the

ultimate transmission to the remote unit. For example, Hashem '569 repeatedly notes that the base station may use the unacceptable subcarriers to transmit low-sensitivity data to the remote unit, or to transmit data at a low transmission rate, or may divert transmission power from the remaining unacceptable subcarriers to other subcarriers. '569 Patent at 3:25-32, 5:24-40, 6:29-39, 8:15-20.

307. Nowhere does Hashem '569 teach that the unacceptable subcarriers be used for simultaneous transmission to another remote unit. Only one remote unit is served by the base station at a given time, as is evident from the fact that all the subcarriers, whether acceptable or unacceptable, may be used for transmission to the one remote unit. Thus, Hashem '569 is not, as Fuja contends, an OFDMA system.

308. Fuja provides an example from Hashem '569 of the structure of the feedback from the remote unit, where he sets forth an exemplary "bitmask." This bitmask is a string of bits, each of which is set to either 1 or 0 to indicate whether the subcarrier (or subband) to which that bit corresponds is acceptable or unacceptable. The bitmask provides feedback for all subcarriers (or subbands), and the bit order in the bitmask corresponds to the subband order in the bandwidth. '569 Patent at 6:11-26, 7:31-51, 8:31-35. Therefore, as Fuja himself explains, the remote unit does not need to transmit a subcarrier (or subband) index identifying the channel to which each bit corresponds.

309. However, Fuja is incorrect when he states that one skilled in the art would have been motivated to combine the above described Hashem '569 approach with the Project Angel system. The two are incompatible.

310. The Project Angel system describes the [redacted]

311. This demonstrates that the [redacted]

312. The Project Angel system describes a [redacted]

313. Hashem '569 discloses a bitmask that contains one bit for each subband in the bandwidth and the bit order of which corresponds to the subband order in the bandwidth, such that no index or other indicator is needed for the base station to determine which feedback bit corresponds to which subband: they are in sequential order. The reason Hashem '569 discloses feedback on all available subbands is that even unacceptable subbands may be used for transmission to the remote unit. The Project Angel system,

314. Because the sequentially ordered bitmask approach of Hashem '569 is incompatible with the of the Project Angel system, it would not have been obvious to one of ordinary skill in the art to combine Hashem '569 with the Project Angel system.

16. Claim 16, '212 Patent

315. Claim 16 depends from claim 1 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 1 of the '212 Patent, claim 16 is not anticipated and/or rendered obvious by the Project Angel system.

17. Claim 18, '212 Patent

316. Claim Element 18[c][1] and [c][2] of the '212 patent states: "each of said plurality of subscriber units to measure channel and interference information for the plurality of subcarriers based on pilot symbols received from the first based station." As discussed in claim element 8[a] of the '748 patent, Fuja provides no documentary evidence that this element was disclosed during the [redacted] implementation.

Claim Element 18[c][6]

317. My analysis set forth above for claim element 1[e][2] of the '212 Patent, which is incorporated herein by reference, demonstrates that the Project Angel system does not disclose or meet the limitations of this claim or render this claim obvious.

Claim Element 18[c][7]

318. My analysis set forth above for claim element 1[e][2] of the '212 Patent, which is incorporated herein by reference, demonstrates that the Project Angel system does not disclose or meet the limitations of this claim or render this claim obvious.

18. Claim 24, '212 Patent

319. Claim 24 states: "The apparatus defined in claim 23 wherein the additional information comprises traffic load information on each cluster of subcarriers." The documentary evidence cited in Fuja's report, along with Fuja's opinions, do not prove that Project Angel [redacted] disclosed or rendered obvious this claim.

320. My analysis set forth above for claims 8 and 9 of the '212 Patent, which is incorporated herein by reference, demonstrates that the Project Angel system does not disclose or meet the limitations of this claim or render this claim obvious.

19. Claim 25, '212 Patent

321. Claim 25 of the '212 patent reads: "The apparatus defined in claim 24 wherein the traffic load information is provided by a data buffer in the base station." Fuja refers to his analysis of claim 10 of the '212 patent. The documentary evidence cited in Fuja's report, along with Fuja's opinions, do not prove that Project Angel [redacted] disclosed or rendered obvious this claim element.

322. Fuja did not cite evidence of [redacted] of a [redacted] Fuja's heading is thus that this claim is rendered obvious by Project Angel; however, he relies on the '748 patent, the Sollenberger patent, the Airy patent, and the Liu patent, not Project Angel alone. The only citation to Project Angel is from [redacted]

323. Consequently, Fuja fails to provide evidence of obviousness that "the traffic load information is provided by a data buffer in the base station."

20. Claim 26, '212 Patent

324. Claim 26 states: "[t]he apparatus defined in claim 18 wherein the indication of subcarriers is received via a downlink control channel between the base station and the at least one subscriber unit." The documentary evidence cited

in Fuja's report, along with Fuja's opinions, do not prove that the Project Angel system [redacted] disclosed or rendered obvious this claim element.

325. As noted by Fuja, this claim requires an original indication and an updated indication be received via a downlink control channel. Fuja fails to provide any documentary evidence that at least one subscriber unit receives an updated indication via a downlink control channel. Furthermore, [redacted] is inconclusive. Finally, Fuja fails to show anything concerning the downlink control channels [redacted]

326. Fuja's citations say nothing about an updated indication. The first and second generally describe [redacted] Finally, Fuja fails to provide any evidence providing a nexus between his documentary evidence and the demonstrations [redacted]

21. <u>Claim 28, '212 Patent</u>

327. Claim 28 reads: "The apparatus defined in claim 18 wherein the plurality of subscriber units provide feedback information that comprises an arbitrarily ordered set of candidate subcarriers as clusters of subcarriers."

328. Claim 28 depends from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, claim 28 is not anticipated or rendered obvious by the Project Angel system.

22. Claim 29, '212 Patent

329. Claim 29 reads: "The apparatus defined in claim 18 wherein providing feedback information comprises sequentially ordering candidate clusters."

330. Claim 29 depends from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, as well as claim 12 of the '212 Patent, claim 29 is not anticipated or rendered obvious by the Project Angel system.

23. Claim 30, '212 Patent

331. Claim 30 reads: "The apparatus defined in claim 18 wherein the base station allocates a first portion of the subcarriers to establish a data link between the base station and the subscriber unit; and then allocates a second portion of the subcarriers to the subscriber unit to increase communication bandwidth."

332. Claim 30 depends from claim 18 of the '212 Patent and recites further limitations. Therefore, for at least the reasons set forth above with respect to claim 18 of the '212 Patent, claim 30 is not anticipated or rendered obvious by the Project Angel system.

SECONDARY INDICIA / CONSIDERATIONS OF NON-OBVIOUSNESS

1. *Introduction*

333. A longstanding objective in cellular communications systems has always been to increase the throughput for dependable data communications to/from mobile wireless devices. This need has been exacerbated by the fact that large percentages of legacy telephony users have been disconnecting their wired telephones altogether and using their mobile telephones for all of their telecommunications needs, both voice and data. Cellular networks and devices, therefore, have been under unrelenting pressure to accommodate data communications at faster and faster data rates by an increasing number of users who demand it.

334. This is apparent in the driving force behind 3GPP, the 3G Partnership Project, which had been tasked to force a collaboration to bring together a number of formerly disparate national cellular standards (including ETSI) and to develop a third, and subsequent, generation of cellular architecture that improved upon cellular telecommunications for data (which includes voice). It is significant that, although 3GPP was established in 1998, the 3GPP specifications for 4G/LTE, which are the subjects of the current patent infringement cases, came several years afterwards – and after the effective filing dates of the ‘212 and ‘748 patents.

335. Just prior to the formation of 3GPP, in December 1997, ETSI released TR 101 146 version 3.0.0 entitled “Technical Report Universal Mobile Telecommunications System (UMTS); UMTS Terrestrial Radio Access (UTRA); Concept evaluation (UMTS 30.06 version 3.0.0)” (hereinafter “ETSI UTRA

Concept Evaluation"). This technical report discloses work undertaken by ETSI from 1996 to 1997 to evaluate five different concepts, with a view to developing the next generation UMTS radio access technology. An OFDMA-based technology was one of five concepts proposed. As such, this technical report presents an aspirational view of what a future OFDMA-based 3G network may look like.

336. ETSI meeting minutes show that the ETSI UTRA Concept Evaluation report and these five proposals were considered at the ETSI Technical Committee SMG (Special Mobile Group) meeting (SMG#24) held in Madrid, Spain on 15-19 December, 1997. Meeting minutes show this meeting was attended by 270 delegates, including delegations from major standards setting organizations in US, China, Japan, and Europe, as well as five ETSI board members. ETSI/TC SMG(97)5 at 2. The minutes further show that at least four of the five concepts, including the OFDMA-based proposal (known as the beta concept) were presented and discussed. Id. at 17 to 26. A vote of intent was held on which of the four concepts presented and discussed was delegates' preferred choice. Of 141 ETSI members who cast votes, 0% voted for the OFDMA-based proposal, receiving zero of 1,392 votes cast. Id. at 26-27. Notably, as per the "Complete List of SMG Contact Persons and Participants To SMG#24," not a single one of the listed 15 Ericsson delegates, 14 Alcatel delegates or six Lucent delegates voted for the OFDMA-based proposal. Id. at 49-106.

337. At the next ETSI SMG meeting (SMG#24bis, Paris, 28-29 January, 1998), minutes show that again the four proposals were discussed, and a vote was taken

as to which concept would be the choice for UTRA. ETSI/TC SMG(98)1 at 6-7. Of 198 ETSI members who cast votes, 0% voted for the OFDMA-based proposal, receiving zero of 1,523 votes cast. Id. Based on this vote, ETSI formally agreed to proceed with a WCDMA-based technology for the future 3G UMTS standard, and not to use an OFDMA-based solution. As per the "List of attendees to SMG#24bis," not a single one of the listed 17 Ericsson delegates (including Dr. Erik Dahlman), 16 Alcatel delegates or six Lucent delegates voted for the OFDMA-based proposal. Id. at 14-19.

338. As such, OFDMA was rejected as a potential solution for a future cellular network by arguably the world's dominant standard setting organization, comprising essentially all of the major wireless telecom manufactures, operations and regulators in the world.

2. *Skepticism*

339. This shows skepticism of using an OFDMA solution for a wireless cellular network, as none of the delegates voted for OFDMA in comparison to WCDMA.

3. *Satisfied Long Felt Need*

340. As noted above, a long felt need has been to provide a new generation of wireless technology that would improve throughput. Ultimately, when OFDMA was adopted and deployed (the first LTE technical specifications were released in 2008, and in 2010 MetroPCS offered the first commercially available LTE service in the U.S.), it has been shown that 4G/LTE mobile phones may achieve data transmission rates that are 10 to 100 times faster than 3G mobile phones.

341. ***Failure of Others***

342. This further shows the failure of others to devise an OFDMA solution that was suitable, and a failure to recognize that the features of the '212 and '748 patents would have facilitated a solution. Specifically, e.g., referring to pages 217 et seq. of the Technical Report, the OFDMA concept being considered did not employ FSS where subband reporting was used. Moreover, there was no teaching in the Technical Report of using subband feedback from a mobile station to the base station, and of performing dynamic allocation based on that subband feedback. Meanwhile, the concept was evaluated, and as a result the concept was rejected.

343. ***Commercial Success***

344. The adoption of LTE by carriers and handset manufacturers is in large part because of this increase in throughput, which is in large part because of the deployment of FSS in current LTE networks. The ability to optimally deploy FSS (and thus achieve maximum throughput) requires the claimed inventions of both the '212 and '748 patents. The '212 patent claims, e.g., claim 1, facilitate repeated subband feedback—an essential element of FSS (which uses this feedback to make channel allocation decisions); and the '748 patent claims, e.g., claim 8, provides subband coding and modulation rate information which allows a scheduler to optimize throughput by upgrading or downgrading coding and modulation rates on a per subband basis. Further information and evidence about the commercial success that has followed the use of these aspects of the '212 and '748 patents is provided in my infringement reports involving the same patents.

E. INDEFINITENESS

345. Fuja opines that certain claims are indefinite. I disagree.

346. Under the claim construction of the Texas court, Claims 8 and 9 of the '748 patent are readily understood as describing a method that includes, among other steps, a subscriber unit's measuring channel and interference information, selecting a set of subcarriers, and providing feedback on that set to the base station, which feedback includes an indication of desired coding and modulation rates for each cluster, where clusters are logical units of at least two physical subcarriers. Under that court's construction, the subscriber unit would infringe when it provides the specified coding and modulation rates for clusters, as opposed to merely for individual subcarriers. If the feedback information is for clusters, then the subcarriers that belong to any given cluster are those corresponding to that transmission of coding and modulation rate.

347. The California court has not issued a contrary construction; until it does, the above would apply in that case, as well.

348. I also agree with the Texas court that claim 11 of the '748 patent is not indefinite, for all of the reasons the court stated, including that the functional language in the claim is a description of the manner in which the components of the apparatus in the claim operate.

349. Under the claim construction of the Texas court, Claims 9 and 10 of the '212 patent would be readily understood as describing a method that includes, among other steps, a subscriber unit's measuring channel and interference information, selecting a set of subcarriers, and providing feedback on that set to the base station, with the base station then selecting subcarriers from that set

based on traffic load information on each cluster, where clusters are logical units of at least two physical subcarriers. Under that court's construction, the operator of the system would infringe when the base station bases its selection on traffic load information for clusters, as opposed to merely for individual subcarriers.

350. The California court has not issued a contrary construction; until it does, the above would apply in that case, as well.

351. Claim 11 of the '212 patent would be readily understood as describing a method that includes, among other steps, a subscriber unit's measuring channel and interference information, selecting a set of subcarriers, and providing feedback on that set to the base station; the subscriber unit's then receiving an indication of subcarriers; and then submitting updated feedback, and receiving an updated indication of subcarriers. Claim 11 adds the limitation that "the indication of subcarriers is received via a downlink control channel."

352. Dr. Fuja, puzzlingly, assumes that claim 11 requires that only one of the "indication(s)" in claim 1 can be received via a downlink control channel. He provides no explanation for such an odd assumption. Rather, absent some contrary indication in the written description or prosecution history – and I found none – a person of skill in the art would understand that the claim requires each to be received via a downlink control channel. (Claim 26 of the '212 patent presents the same issue; my opinion would be the same, and for the same reasons.)

353. As for claim 18 of the '212 patent, I have been told to assume that it contains an obvious error, which the court will correct before I testify at trial.

IV. CONCLUSIONS

354. For the foregoing reasons, it is my opinion and conclusion that all Asserted Claims of the Patents-in-Suit are valid.

SIGNATURE BLOCK

Dated: August 27, 2014

By:_____
MICHAEL CALOYANNIDES, Ph.D.

Exhibit List

Exhibit A: List of Materials Relied Upon

Exhibit B: Analysis of Project Angel

EXHIBIT A – LIST OF MATERIALS RELIED UPON

1. Fuja's Invalidity Report
2. US Patent 6,947,748 (the '748 patent)
3. US Patent 7,454,212 (the '212 patent)
4. Hashem US Patent 6,721,569 (Hashem '569)
5. Sollenberger US Patent 6,052,594
6. Chuang and Sollenberger Article "Wideband Data Access…"
7. Documents cited by Fuja in his report, including:
   a. [redacted]
   b. [redacted]
   c. [redacted]
8. 3GPP TS 36.300.V8.12.0 (2010-03) pp 70-71
9. US 5,491,837 (Haartsen)
10. US 5,577,022 (Radovani)
11. ETSI TR 101 146 V3.0.0 (1997-12) UMTS Concept Evaluation
12. US 7,072,315 (Liu)
13. US 6.760,882 (Gesbert)
14. US 5,479,447 (Chow)
15. US 5,867,478 (Baum)
16. US 6,175,550 (Van Nee)
17. US 6,795,424 (Kapoor)
18. US 6,400,699) (Airy)
19. US 7,230,908 (Vanderaar)
20. My own experience and background and education over the last 50+ years in this field.
21. Ritter

EXHIBIT B – PROJECT ANGEL SYSTEM

Introduction

355. The following facts pertain to Fuja's anticipation and obviousness analyses regarding Project Angel generally and with respect to §§102(a), (b), (f), and (g)(2).

356. Project Angel was a [redacted]

357. The §102(a) and (b) critical dates for the Asserted Claims of the '748 and '212 patents are December 15, 2000 and December 15, 1999, respectively.

358. As a general matter, Fuja attempts to construct a single Project Angel system for use throughout his anticipation and obvious analysis. However, as discussed below, [redacted] of Project Angel after each of the 102(a) and 102(b) critical dates, and specifically [redacted] that Fuja has claimed anticipate and/or render obvious the asserted claims.

Public Use (102)(b))

359. Fuja states that the "Project Angel System [redacted]

360. Fuja primarily relies on a draft document [redacted] after the 102(b) critical date to describe the functionality of a Project Angel system allegedly in public use several months before that date.

361. The document, titled [redacted]

362. Defendants have not produced the [redacted] disclosed a system in public use before the 102(b) critical date.

363. Moreover, [redacted] evidence contradicts the notion that [redacted] describes a system in public use prior to the 102(b) critical date.

364. First, Fuja states that the publicly used [redacted]

365. However, the [redacted] described in the [redacted]

366. Second, Fuja states that the publicly used pre-102(b) system employed a [redacted]

[redacted]

367. However, the [redacted]

368. Third, Fuja states that the publicly used pre-102(b) system [redacted]

369. However, [redacted]

370. [redacted] own documents state that the [redacted]

371. Indeed, a draft of the second version of the [redacted]

372. Further evidence that any Project Angel system publicly used before the 102(b) critical date did not include [redacted]

[redacted]

373. In fact, as late as [redacted]

374. Therefore, neither [redacted] prior to the critical date 102(b) date. [redacted] only developed and/or implemented, if at all, well after December 15, 1999.

Experimentation and Public Use under 102(b)

375. Regardless of what Project Angel system, if any, [redacted] well after the 102(b) critical date.

376. [redacted]

[redacted]

377. Project Angel was [redacted] at all times before the 102(b) critical date.

378. First, during [redacted]

379. Second, [redacted]

380. Third, [redacted]

[redacted]

381. Fourth, even news articles discussing the [redacted]

382. Even by [redacted]

383. [redacted]

384. [redacted]

385. [redacted]

[redacted]

386. [redacted]

387. Finally, it is doubtful that [redacted]

145.

388. Accordingly, contrary to Fuja's statement, the Project Angel system had not even been [redacted] before the 102(b) critical date, and was thus not ready for patenting.

Prior Use and Knowledge (§102(a))

389. Fuja also states that "[t]he Project Angel system was "known or used by others in this country" before the invention date of the Asserted Claims."

390. For the following reasons, and to the extent the Project Angel system used [redacted]

391. Fuja states, "In addition to the [redacted]

392. However, Fuja offers no evidence that the functional specifications of this system were publicly available, and certainly none that would have been sufficient to enable one of ordinary skill to construct and practice the claimed invention.

393. Instead, as stated above, all technical information, including [redacted] deployed before the 102(a) critical date, [redacted]

[redacted]

394. Furthermore, to the extent a Project Angel system could be deemed to have been in use or known prior to the 102(a) critical date, the system did not include [redacted]

395. The second generation system was not released or deployed before the 102(a) critical date and, accordingly, [redacted]

396. Thus, contrary to Fuja's statement, the Project Angel system had not been designed, much less reduced to practice, before the 102(a) critical date, and was thus not ready for patenting.

On-Sale Bar (102(b))

397. Fuja states that the "Project Angel System [redacted]

398. Again, Fuja chiefly relies on a draft document created more than two months after the critical 102(b) date to describe the functionality of that Project Angel system.

399. As above, the [redacted]

400. Defendants have not produced the [redacted] and have provided no evidence that the draft document dated after the 102(b) critical date discloses a system that was on sale before that date.

401. It is unlikely that the [redacted] discloses a system that was on sale use prior to the critical date.

402. First, Fuja states that the on sale "Project Angel system included a [redacted]

403. However, the [redacted]

404. Second, Fuja states that another feature of the on sale Project Angel system was a [redacted]

[redacted]

405. However, the [redacted]

406. Third, Fuja states that the Project Angel system on sale before the critical date [redacted]

407. However, [redacted]

408. [redacted]

409. Indeed, a draft of the second version of the [redacted]

410. Further evidence that any Project Angel system publicly used before the 102(b) critical date did not include [redacted]

411. In fact, as late as [redacted]

412. Thus, neither [redacted] on sale prior to the critical date 102(b) date, as both were only developed and/or implemented, if at all, well after December 15, 1999.

413. Additional evidence of this is seen in [redacted]

414. Thus, contrary to Fuja's claims, the invention was not ready for patenting before the 102(b) critical date, as it had not been reduced to practice before December 15, 1999.

415. It is also doubtful that [redacted]

Experimentation and the On-Sale Bar (102(b))

416. Regardless of what Project Angel system, if any, [redacted] well after the 102(b) critical date.

417. In [redacted]

[redacted]

418. Project Angel was also [redacted] before the 102(b) critical date.

419. First, during [redacted]

420. Second, [redacted]

421. Third, [redacted]

[redacted]

422. Fourth, even news articles discussing the commercial launch of Project Angel in [redacted]

423. Even by [redacted]

424. [redacted]

425. [redacted]

426. [redacted]

[redacted]

427. [redacted]

428. In light of the foregoing, and contrary to Fuja's statement, the Project Angel system had not even been designed, much less reduced to practice, before the 102(b) critical date, and was thus not ready for patenting.

Derivation (102(f))

429. Despite having thousands of both Broadstorm and Adaptix emails, and having alleged that [redacted]

430. Chief inventor of the asserted patents, Dr. Hui Liu, had never seen the [redacted]

application for the asserted patents and has testified to that effect under oath. *See*, July 2, 2014 Deposition of Dr. Hui Liu ("Liu Dep.") at 690-695.

431. Neither [redacted]

432. [redacted]

433. [redacted]

434. Moreover, Fuja fails to identify a single reference evidencing the prior conception of the invention disclosed by any of the Asserted Claims of the '748 and '212 patents, [redacted]

Prior Invention (§102(g)(2))

435. As noted above, the Project Angel system was a [redacted]

436. At all times from the [redacted]

437. Thus, even assuming that [redacted]