UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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NETAPP INC.,
Petitioner

v.

PROVEN NETWORKS, LLC,
Patent Owner

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Case IPR2022-00644
Patent No. 8,687,573

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**DECLARATION OF DR. ROBERT AKL, D.Sc.**

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I, Robert Akl, D.Sc. of Dallas, Texas, declare that:

## I. Introduction

1. My name is Robert Akl, and I have been retained by counsel for Petitioner NetApp, Inc. ("NetApp" or "Petitioner") as an expert witness to provide assistance regarding U.S. Patent No. 8,687,573 ("the '573 Patent"). Specifically, I have been asked to consider the validity of claims 1–39 of the '573 Patent (the "Challenged Claims") in view of prior art, anticipation and obviousness considerations, and understanding of a person of ordinary skill in the art at the time of the invention ("POSITA") as it relates to the '573 Patent. I have personal knowledge of the facts and opinions set forth in this declaration and believe them to be true. If called upon to do so, I would testify competently thereto.

2. I am being compensated for my time at my standard consulting rate. I am also being reimbursed for expenses that I incur during the course of this work. My compensation is not contingent upon the results of my study, the substance of my opinions, or the outcome of any proceeding involving the challenged claims. I have no financial interest in the outcome of this matter or on the pending litigation between Petitioner and Patent Owner.

3. My analysis here is based on my years of education, research and experience, as well as my investigation and study of relevant materials, including those cited herein.

4. I may rely upon these materials, my knowledge and experience, and/or additional materials to rebut arguments raised by the Patent Owner. Further, I may also consider additional documents and information in forming any necessary opinions, including documents that may not yet have been provided to me.

5. My analysis of the materials produced in this proceeding is ongoing and I will continue to review any new material as it is provided. This declaration represents only those opinions I have formed to date. I reserve the right to revise, supplement, and/or amend my opinions stated herein based on new information and on my continuing analysis of the materials already provided.

## II. Background and Qualifications

6. I am an expert in the field of telecommunication systems. I have studied, taught, practiced, and researched this field for over 27 years. I have summarized in this section my educational background, work experience, and other relevant qualifications. Ex. 1004 is a true and correct copy of my curriculum vitae describing my background and experience.

7. I earned my Bachelor of Science degrees in Electrical Engineering and Computer Science *summa cum laude* with a grade point average of 4.0/4.0 and a ranking of first in my undergraduate class from Washington University in St. Louis in 1994. In 1996, I earned my Master of Science degree in Electrical Engineering from Washington University in St. Louis with a grade point average of 4.0/4.0. I

earned my Doctor of Science in Electrical Engineering from Washington University in St. Louis in 2000, again with a grade point average of 4.0/4.0, with my dissertation being on "Cell Design to Maximize Capacity in Cellular Code Division Multiple Access (CDMA) Networks."

8. While a graduate student, from 1996 through 2000, I worked at MinMax Corporation in St. Louis, where I designed software packages that provided tools to flexibly allocate capacity in a CDMA communications network and maximize the number of subscribers. I also analyzed and simulated different audio compression schemes. I also validated the hardware architecture for an Asynchronous Transfer Mode (ATM) switch capable of channel group switching, as well as performed logical and timing simulations, and developed the hardware architecture for the ATM switch. I also worked with Teleware Corporation in Seoul, South Korea, where I designed and developed algorithms that were commercially deployed in a software package suite for analyzing the capacity in a CDMA network implementing the IS-95 standard to maximize the number of subscribers.

9. After obtaining my Doctor of Science degree, I worked as a Senior Systems Engineer at Comspace Corporation from October of 2000 to December of 2001. At Comspace, I designed and developed advanced data coding and modulation methods for improving the reliability and increasing the available data rates for cellular communications. I coded and simulated different encoding

schemes (including Turbo coding, Viterbi decoding, trellis coded modulation, and Reed-Muller codes) and modulation techniques using amplitude and phase characteristics and multi-level star constellations. This work further entailed the optimization of soft decision parameters and interleavers for additive white Gaussian and Rayleigh faded channels. In addition, I also extended the control and trunking of Logic Trunked Radio (LTR) to include one-to-one and one-to-many voice and data messaging.

10. In January of 2002, I joined the faculty of the University of New Orleans in Louisiana as an Assistant Professor in the Department of Electrical Engineering. While in this position, I designed and taught two new courses called "Computer Systems Design I and II." I also developed a Computer Engineering Curriculum with a strong hardware-design emphasis, formed a wireless research group, and advised graduate and undergraduate students.

11. In September of 2002, I received an appointment as an Assistant Professor in the Department of Computer Science and Engineering at the University of North Texas (UNT), in Denton, Texas. In May of 2008, I became a tenured Associate Professor in the Department of Computer Science and Engineering. As a faculty member, I have taught courses and directed research in networking and telecommunications, including 2G, 3G, 4G, 5G, CDMA/WCDMA, GPS, GSM, UMTS, LTE, ad-hoc networks, antenna design and beamforming, Bluetooth, call

admission control, channel coding, communication interfaces and standards, compression, computer architecture, MIMO systems, multi-cell network optimization, network security, packet-networks, telephony, VoIP, Wi-Fi (802.11), 802.15.4, Zigbee, wireless communication, and wireless sensors. I am also the director of the Wireless Sensor Lab ("WiSL") at UNT. I am a member of the Center for Information and Cyber Security (CICS). It is the only program in the U.S. to be federally certified by the National Security Agency as a Center of Academic Excellence in Information Assurance Education and Research and Cyber Defense Research. I am also a member of the NSF Net-Centric & Cloud Software & Systems: Industry-University Cooperative Research Center (I/UCRC). Several of my research projects are funded by industry. In January of 2015, I was promoted to Associate Chair of Graduate Studies in the Department of Computer Science and Engineering.

12. In addition to advising and mentoring students at UNT, I was asked to join the faculty of the University of Arkansas in Little Rock as an Adjunct Assistant Professor from 2004 to 2008 in order to supervise the research of two Ph.D. graduate students who were doing research in wireless communications. At UNT, I have advised and supervised more than 250 undergraduate and graduate students, several of whom received a master's or doctorate degree under my guidance.

13. Further, since 2005, I have received over a million dollars in funding

from the State of Texas, Texas Higher Education Coordination Board, the National Science Foundation, and industry to design and conduct robotics, video, and mobile gaming (*e.g.*, Xbox, PC, mobile device) programming summer camps for middle and high school students at UNT. By using video and mobile gaming as the backdrop, participants have learned coding and programming principles and developed an understanding of the role of physics and mathematics in video game design.

14. In addition to my academic work, I have remained active in the communication industry through my consulting work. In 2002, I consulted for Input/Output Inc. and designed and implemented algorithms for optimizing the frequency selection process used by sonar for scanning the bottom of the ocean. In 2004, I worked with Allegiant Integrated Solutions in Ft. Worth, Texas, to design and develop an integrated set of tools for fast deployment of wireless networks, using the 802.11 standard. Among other features, these tools optimize the placement of Access Points and determine their respective channel allocations to minimize interference and maximize capacity. I also assisted the Collin County Sheriff's Office (Texas) in a double homicide investigation, analyzing cellular record data to determine user location.

15. I have authored and co-authored over 100 journal publications, conference proceedings, technical papers, book chapters, and technical presentations

in a broad array of communications-related technologies, including networking and wireless communication. I have also developed and taught over 100 courses related to communications and computer systems, including several courses on signals and systems, 4G/LTE and 5G/NR, OFDM, VoIP, Wi-Fi (802.11), 802.15.4, Zigbee, wireless communication, antenna design and beamforming, communications systems, communication interfaces and standards, sensor networks, source coding and compression, network security, computer systems design, game and app design, and computer architecture. These courses have included introductory courses on communication networks and signals and systems, as well as more advanced courses on wireless communications. A complete list of my publications and the courses I have developed and/or taught is also contained in my *curriculum vitae*.

16. My professional affiliations include services in various professional organizations and serving as a reviewer for a number of technical publications, journals, and conferences. I have also received a number of awards and recognitions, including the IEEE Professionalism Award (2008), UNT College of Engineering Outstanding Teacher Award (2008), and Tech Titan of the Future (2010) among others, which are listed in my *curriculum vitae*.

17. I have also served as an expert in certain legal proceedings. A list of cases in which I have testified at trial, hearing, or by deposition (including those during the past five years) is provided in my *curriculum vitae*. Over the years, I have

been retained by both patent owners and petitioners.

## III. Level of Ordinary Skill in the Art

18. In rendering the opinions set forth in this declaration, I was asked to consider the patent claims and the prior art through the eyes of a person of ordinary skill in the art ("POSITA") at the time of the alleged invention, which I understand is asserted to be May 30, 2008—the earliest claimed priority date of the '573 patent. I understand that the factors considered in determining the ordinary level of skill in a field of art include the level of education and experience of persons working in the field; the types of problems encountered in the field; the teachings of the prior art, and the sophistication of the technology at the time of the alleged invention. I understand that a POSITA is not a specific real individual, but rather is a hypothetical individual having the qualities reflected by the factors above. I understand that a POSITA would also have knowledge from the teachings of the prior art, including the art cited below.

19. Taking these factors into consideration, on or before May 30, 2008, a POSITA of the '573 Patent would have had a Bachelor's degree in electrical engineering, computer engineering, computer science, or a related field, and at least one year of experience in the design or development of telecommunication systems, or the equivalent. With more education, less experience is needed, and vice versa.

20. Before May 30, 2008, my level of skill in the art was at least that of a

POSITA. I am qualified to provide opinions concerning what a POSITA would have known and understood at that time, and my analysis and conclusions herein are from the perspective of a POSITA as of that date.

## IV. Materials Considered and Relied Upon

21. In reaching the conclusions described in this declaration, I have relied on the documents and materials cited herein as well as those identified in this declaration, including the '573 Patent, the prosecution history of the '573 Patent, and prior art references cited herein. These materials comprise patents, related documents, and printed publications. Each of these materials is a type of document that experts in my field would have reasonably relied upon when forming their opinions.

22. In the cited references, all emphasis is added unless otherwise noted.

23. I have also relied on my education, training, research, knowledge, and personal and professional experience in the relevant technologies and systems that were already in use prior to, and within the timeframe of the earliest priority date of the claimed subject matter in the '573 Patent, which is May 30, 2008.

- **Ex. 1001:** U.S. Patent No. 8,687,573 ("the '573 patent")
- **Ex. 1002:** Prosecution History of U.S. Patent No. 8,687,573
- **Ex. 1005:** Pedersen, U.S. Patent No. 6,993,332 ("Pedersen")
- **Ex. 1006:** Universal Mobile Telecommunications System (UMTS); QoS Concept and Architecture (Release 1999) (3GPP TS 23.107 V3.5.0 (2000-12))

- **Ex. 1007:** 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; GPRS enhancements for E-UTRAN access (Release 8) (3GPP TS 23.401 V1.0.0 (2007-05))
- **Ex. 1008:** 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Policy and charging control architecture (Release 7) (3GPP TS 23.203 V7.2.0 (2007-03))
- **Ex. 1009:** 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2 (Release 8) (3GPP TS 36.300 V8.0.0 (2007-03))
- **Ex. 1011:** Juha Korhonen, Introduction to 3G Mobile Communications, Second Edition (2003)
- **Ex. 1012** 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Vocabulary for 3GPP Specifications (Release 8)
- **Ex. 1014** U.S. Patent No. 7,072,663
- **Ex. 1015** U.S. Patent No. 7,653,140
- **Ex. 1016** U.S. Patent App. Pub. No. 2004/0192317
- **Ex. 1017** U.S. Patent App. Pub. No. 2009/0016344
- **Ex. 1023** U.S. Patent App. Pub. No. 2006/0019647A1
- **Ex. 1024** U.S. Patent No. 8,792,439
- **Ex. 1025** U.S. Patent App. Pub. No. 2021/0258832
- **Ex. 1026** U.S. Patent No. 8,599,778

## V. Legal Standards

24. I am not a lawyer and do not provide any legal opinions, but I have been advised that certain legal standards are to be applied by technical experts in forming opinions regarding meaning and validity of patent claims. I have applied the legal standards described below, which were provided to me by counsel for the Petitioner.

25. It is my understanding that assessing the validity of a U.S. patent based on a prior art analysis requires two steps. First, one must construe the terms of the

patent claims to understand what meaning a POSITA would have given the terms. Second, after the claim terms have been construed, one may then assess validity by comparing a patent claim to the "prior art." I understand that the teaching of the prior art is viewed through the eyes of a POSITA at the time the invention was made. My analysis as to what constitutes a relevant a POSITA is set forth above.

### A. Legal Standards for Prior Art

26. I understand that a patent or other publication must first qualify as prior art before it can be used to invalidate a patent claim.

27. I understand that a U.S. or foreign patent qualifies as prior art to a patent if the date of issuance of the U.S. or foreign patent is prior to the invention of the patent. I further understand that a printed publication, such as an article published in a magazine or trade publication, qualifies as prior art to a patent if the date of publication is prior to the invention of the patent. My understanding is that, for such prior art references, a patentee may attempt to show that the claimed invention was conceived prior to the issuance of the U.S. foreign patent or publication of the printed materials. To do so, it is my understanding that patentee must prove with corroborating evidence that the named inventors conceived of the complete claimed invention before the prior art and were diligent in reducing the claimed inventions to practice.

28. I understand that, regardless of the date of invention of the patent, a U.S.

or foreign patent qualifies as prior art to a patent if the date of issuance of the U.S. or foreign patent is more than one year before the earliest effective filing date of the patent. I further understand that a printed publication, such as an article published in a magazine or trade publication, constitutes prior art to a patent if the publication occurs more than one year before the earliest effective filing date of the patent, again regardless of the date of invention of the patent.

29. I understand that a U.S. patent or published U.S. application qualifies as prior art to a patent if the application for that patent was filed in the United States before the invention of the patent. My understanding is that, for such prior art references, a patentee may attempt to show that the claimed invention was conceived prior to the filing in the United States of the purported prior art U.S. patent or application. To do so, it is my understanding that patentee must prove with corroborating evidence that the named inventors conceived of the complete claimed invention before the prior art and were diligent in reducing the claimed inventions to practice.

30. I understand that to qualify as prior art, a reference must contain an enabling disclosure that allows a POSITA to practice the claims without undue experimentation.

31. I understand that documents and materials that qualify as prior art can be used to invalidate a patent claim as anticipated or as obvious.

### B. Legal Standard for Priority Date

32. I understand that the "priority date" or "earliest effective filing date" of a patent is the date on which it is filed, or the date on which an earlier-filed U.S. or international patent application was filed if the patentee claims the benefit of priority to that earlier-filed U.S. or international patent application. I further understand that although a foreign priority document may be used to try to overcome certain prior art references, the effective filing date is not the filing date of a foreign priority document.

### C. Legal Standard for Anticipation

33. I understand that a patent claim is invalid as "anticipated" if each and every limitation of the claim as construed by the Court is found, either expressly or inherently, in a single device or method that predates the claimed invention, or is described in a single previous publication or patent that predates the claimed invention. I understand that, in patent law, these previous devices, methods, publications, or patents are called "prior art." I understand that in order to anticipate a claim, a prior art reference must do more than merely disclose each element of the claim, but rather the prior art reference must disclose all of the elements of the claimed invention arranged as is recited by the claim. I also understand that in order for a prior art reference to anticipate a claim of a patent, the reference must enable one of ordinary skill in the art at the time of the invention to practice the claim

without undue experimentation.

### D. Legal Standard for Obviousness

34. My understanding is that a patent claim is invalid as obvious only if the subject matter of the claimed invention "as a whole" would have been obvious to a POSITA at the time the invention was made. To determine the differences between a prior art reference (or a proposed combination of prior art references) and the claims, the question of obviousness is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. Also, obviousness grounds cannot be sustained by mere conclusory statements. Rather, it is necessary to provide some articulated reasoning with rational underpinning to support the legal conclusion of obviousness.

35. I understand that a patent claim that comprises several elements is not proved obvious by simply showing that each of its elements was independently known in the prior art. In my evaluation of whether any claim of the '573 Patent would have been obvious, I considered whether the Petition, or any evidence submitted in this proceeding, presented an articulated reason with a rational basis that would have motivated a POSITA to combine the elements or concepts from the prior art in the same way as in the claimed invention.

36. It is my understanding that there is no single way to define the line between true inventiveness on one hand—which is patentable—and the application

of common sense and ordinary skill to solve a problem on the other hand—which is not patentable. For instance, factors such as market forces or other design incentives may be the source of what produced a change, rather than true inventiveness.

37. I understand that the decision-maker may consider whether the change was merely the predictable result of using prior art elements according to their known functions, or whether it was the result of true inventiveness. And, the decision-maker may also consider whether there is some teaching or suggestion in the prior art to make the modification or combination of elements recited in the claim at issue. Also, the decision-maker may consider whether the innovation applies a known technique that had been used to improve a similar device or method in a similar way. The decision-maker may also consider whether the claimed invention would have been obvious to try, meaning that the claimed innovation was one of a relatively small number of possible approaches to the problem with a reasonable expectation of success by those skilled in the art.

38. I have been instructed by counsel that if any of these considerations are relied upon to reach a conclusion of obviousness, the law requires that the analysis of such a consideration must be made explicit. I understand that the decision-maker must be careful not to determine obviousness using the benefit of hindsight and that many true inventions might seem obvious after the fact. I understand that the decision-maker should consider obviousness from the position of a POSITA at the

time the claimed invention was made, and that the decision-maker should not consider what is known today or what is learned from the teaching of the patent.

39. I understand that in order to determine whether a patent claim is obvious, one must make certain factual findings regarding the claimed invention and the prior art. Specifically, I understand that the following factors must be evaluated to determine whether a claim is obvious: the scope and content of the prior art; the difference or differences, if any, between the claim of the patent and the prior art; the level of ordinary skill in the art at the time the claimed invention was made; and, if available, the objective indicia of non-obviousness, also known as "secondary considerations."

40. I understand that the secondary considerations include: commercial success of a product due to the merits of the claimed invention; a long felt need for the solution provided by the claimed invention; unsuccessful attempts by others to find the solution provided by the claimed invention; copying of the claimed invention by others; unexpected and superior results from the claimed invention; acceptance by others of the claimed invention as shown by praise from others in the field or from the licensing of the claimed invention; teaching away from the conventional wisdom in the art at the time of the invention; independent invention of the claimed invention by others before or at about the same time as the named inventor thought of it; and other evidence tending to show obviousness.

41. I understand that, to establish a secondary consideration, the evidence must demonstrate a nexus between that secondary consideration and the claimed invention.

## VI. Technical Background

### A. Third-Generation Systems and the Creation of 3GPP

42. A so-called "first generation" of mobile cellular telecommunications systems emerged in the 1980s. These first-generation systems relied on analog transmission techniques and were largely limited to voice communications. A so-called "second generation" of systems replaced the analog transmission of the first generation with digital transmission, allowing for much higher system capacity.

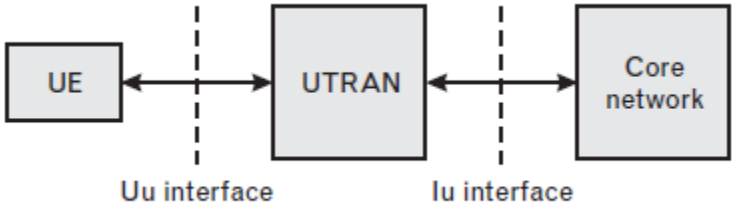
43. In the 1990s, the European Telecommunications Standards Institute ("ETSI") began developing standards for a so-called "third generation" system known as the Universal Mobile Telecommunications System ("UMTS"). Thereafter, several telecommunication providers joined together to form the 3rd Generation Partnership Project ("3GPP"), whose initial aim was to produce specifications for the UMTS system based on ETSI's Universal Terrestrial Radio Access ("UTRA") radio interface. By the 2000s, 3GPP was the primary player in the development of third-generation systems. *See, e.g.,* Ex. 1011, 9 (3GPP included "the most important companies in telecommunications" and, in 2003, was the "organization that bears the greatest responsibility for the 3G development work."); Ex. 1020, ¶26 ("3GPP is

the world's leading organization for developing and maintaining cellular telecommunications standards"). The 3GPP specifications for the UMTS system prescribe implementation details for all aspects of the system. These specifications were divided into series identified by the first two digits in a specification's number, with each series corresponding to a particular aspect of the 3GPP system. By 2008, 3GPP specifications were widely used by those skilled in the art in the design and implementation of telecommunication systems. *See, e.g.,* Ex. 1011, 491–508 (reference book listing 3GPP technical specifications as a reference), 515 (describing 3GPP standards are "the most widely used 3G standards").

**B. The UMTS System**

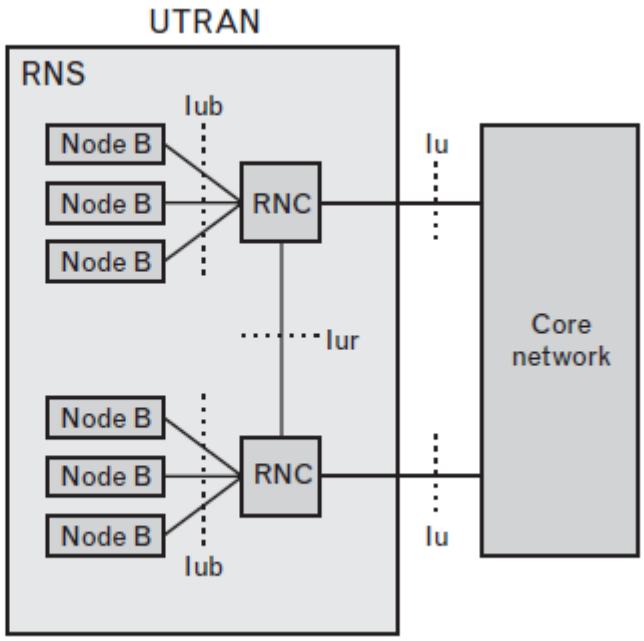
44. A typical UMTS system is shown below. Ex. 1011, 206. As shown, the UMTS system includes a "Core network" connected to a UMTS Radio Access Network ("UTRAN"), which is in turn connected to a user equipment ("UE"). The UE communicates with the Core network through the UTRAN. *See, e.g.,* Ex. 1016, 15–24.

FIGURE 8.2
*High-level UMTS architecture.*



45. The UTRAN, which was designed especially for UMTS, is shown in more detail below. Ex. 1011, 213–14. As shown, the UTRAN includes radio network controllers (RNCs) and Node Bs, which are also called base stations. Ex. 1011, 213. Together, the RNCs and Node Bs form the radio network system ("RNS"). Ex. 1011, 213.

FIGURE 8.4
*UTRAN components and interfaces.*




46. Each RNC controls one or more Node Bs. Ex. 1011, 214; Ex. 1016, 24. The RNC is also connected to one or both of a Mobile Switching Center ("MSC") and a Serving General Packet Radio Service Support Node ("SGSN") in the core network, as shown below. Ex. 1011, 207. The MSC facilitates circuit-switched communications, while the SGSN facilitates packet-switched communications. Ex. 1011, 208, 212. A typical RNC is implemented in a combination of hardware and software. For example, an RNC typically includes a processor, memory for

storing executable instructions, and components to facilitate connections with the Node Bs and the entities of the core network. *See, e.g.*, Ex. 1015, 4:57–5:28 and Figure 2.

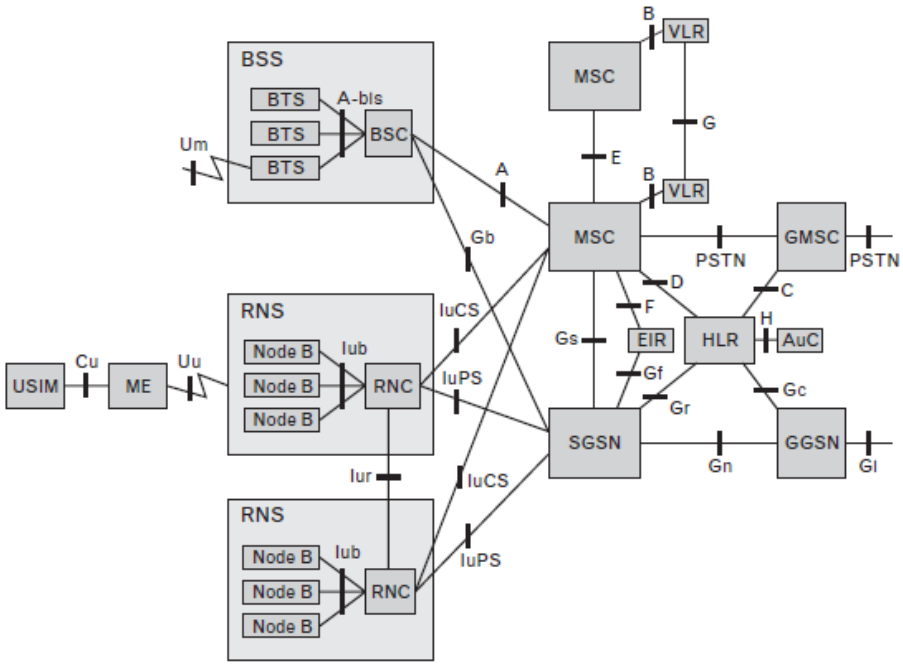



FIGURE 8.3 *UMTS network elements and interfaces.*

47. A UE communicates with the RNC through a Node B. *See, e.g.,* Pedersen, 1:41–47. The transmission path between a Node B and a UE is referred to as a "bearer." Ex. 1012, 8 (3GPP referring to an "information transmission path" as a "bearer"). When a UE moves within the UMTS system, the RNC effects a "handover" for the UE, in which the bearer between the UE and the Node B is replaced with a bearer between the UE and a new Node B. Ex. 1011, 37–38; Pedersen, 1:47–50, 2:39–41.

### C. Admission Control and Quality of Service in the UMTS System

48. One function performed by an RNC in the UMTS system is admission control. Ex. 1011, 214, 273. Admission control is the decision of whether and to what extent resources should be allocated to a bearer for a UE. Ex. 1011, 272. Such a decision is made both when a UE initiates a call and when a UE's call is handed over from one Node B to another, as both involve the establishment of a new bearer for the UE. Ex. 1011, 214, 272.

49. Unlike in second-generation systems, in the UMTS system the UE is able to negotiate the so-called Quality of Service (QoS) parameters of a newly established bearer. Ex. 1011, 402. This allows the bearer to be optimized for the QoS requirements of the particular traffic to be sent over the bearer. Ex. 1011, 402. The UMTS system divides traffic into four "traffic classes"—conversational, interactive, streaming, and background—each of which has corresponding QoS requirements. Ex. 1011, 402. The conversational traffic class, for example, includes UE applications like voice and videophone that are tolerant of some errors but are highly intolerant of delay. Ex. 1011, 402–403. By contrast, the background traffic class includes UE applications like e-mail that, while tolerant of delay, are highly intolerant of errors. Ex. 1011, 404. By enabling the bearer to be optimized for the appropriate traffic class, the UMTS system ensures the QoS requirements of the traffic class can be met. Ex. 1011, 402.

50. To facilitate such optimization of bearers, 3GPP created standardized "bearer attributes" that indicate the QoS requirements for a bearer. 3GPP 23.107. The guaranteed bit rate ("GBR") attribute, for example, specifies the "[m]inimum resource requirement" for a bearer, while the maximum bit rate ("MBR") specifies "the upper limit of the bitrate" for the bearer. 3GPP 23.107, 16, 18. Another example is the aggregate maximum bit rate ("AMBR"), which "denotes a bit rate of traffic per group of bearers" and "limits the aggregate bit rate that can be expected to be provided by the . . . bearers sharing the AMBR." 3GPP 23.401, 16. The attributes for a bearer may be collectively indicated by a QoS Class Identifier ("QCI"). 3GPP 23.203, 49. See also '573 Patent, 2:11–61.

### D. Enhancements to the UMTS System

51. By 2007, 3GPP began to develop specifications for an "Evolved" UTRAN, called E-UTRAN. 3GPP 36.300, 1. Like the UTRAN in the original UMTS, the E-UTRAN optimized bearers according to bearer attributes like GBR, MBR, and AMBR. In addition, the E-UTRAN uses a prioritized bit rate ("PBR") attribute that allows the E-UTRAN to "maximise[] the transmission of higher priority data." 3GPP 36.300, 52.

## VII. Overview of the '573 Patent

### A. Subject Matter Overview

52. The '573 Patent is titled "ALLOCATING RESOURCES WITHIN

COMMUNICATION SYSTEM." The '573 Patent issued on April 1, 2014, from U.S. Patent Application No. 12/994,964 ("the '964 Application"), filed on May 30, 2008. *See* Ex. 1001, Cover.

53. The '573 patent describes "a method for allocating resources in a communications system." '573 patent, Abstract. Like in Pedersen, resources are allocated based on both a "service" and a "user subscriber level." *Id.*, Abstract.

54. According to the '573 patent, it was known to allocate resources based on services. For example, "[e]xisting systems" could "ensure that services such as voice [were] prioritised over browsing." *Id.*, 3:11–13. The purported innovation of the '573 patent was to allocate resources based on *both* services and user subscriber levels. *Id.*, 3:18–23, 6:44–47. "This," the patent explains, "enables operators of communications systems to offer subscribers a range of different user levels which may be offered at a range of different pricing levels." *Id.*, 6:47–49.

55. To this end, the '573 patent envisions a "matrix" nearly identical to that described by one of the named inventors, Jeroen Wigard, nearly six years earlier in Pedersen. As shown in annotated Figure 2 below, the matrix of the '573 patent is "formed of a plurality of services against a plurality of user levels." *Id.*, 5:11–12. The matrix maps five services—Voice Over IP ("VoIP"), Streaming, Internet Browsing, Gaming, and Peer to Peer ("P2P")—against three user subscriber levels—Gold, Silver, and Bronze. *Id.*, 5:6–7, 5:16–19.

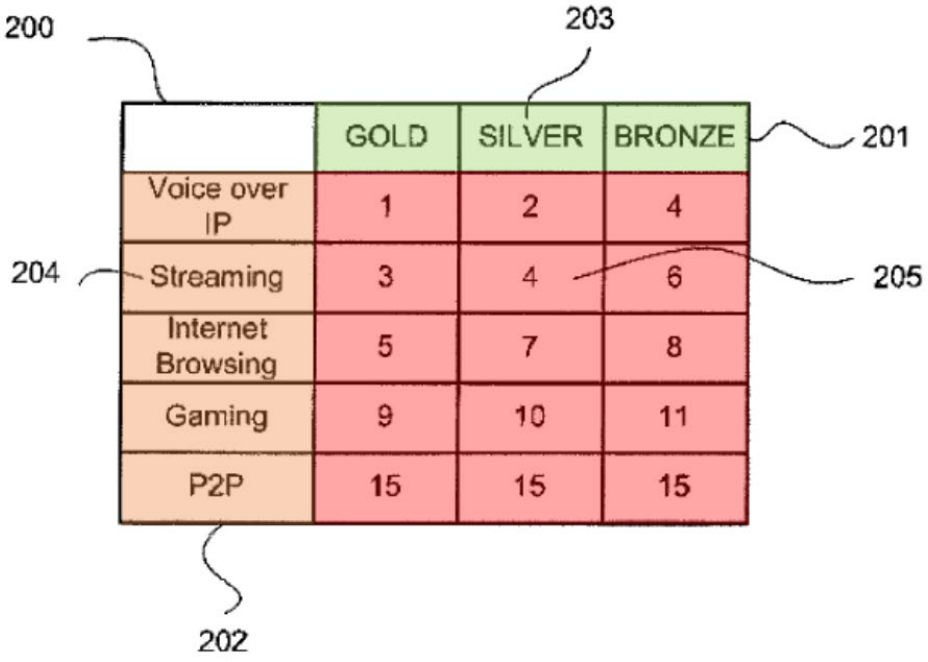
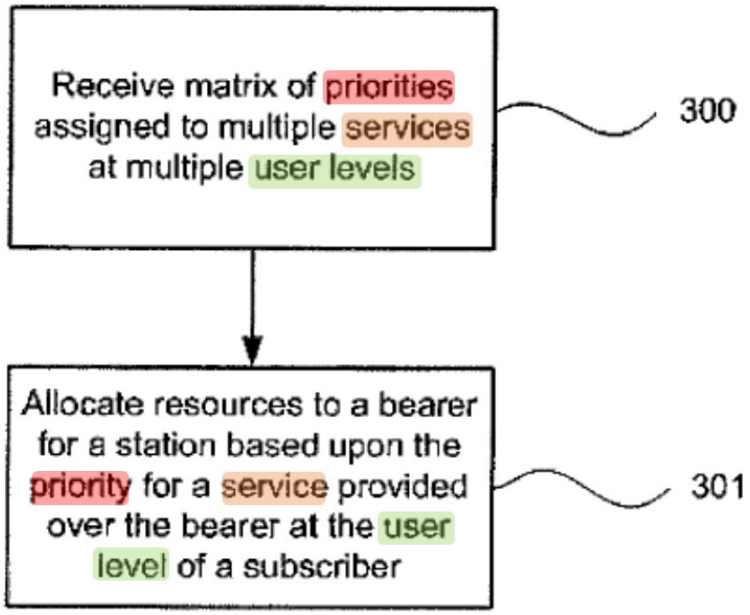



Figure 2

56. In the matrix, "[e]ach service at each user level may be assigned a priority." *Id.*, 5:12–13. The service Streaming at a user subscriber level Gold is assigned the priority 3, for example, while the service Internet Browsing at the user subscriber level Bronze is assigned the priority 8. *Id.*, Figure 2.

57. According to the '573 patent, the matrix is used to allocate resources in the communications network. The method of the '573 patent is illustrated with reference to annotated Figure 3 below. As shown in Figure 3, the matrix is "received"

at Step 300 and then, at Step 301, resources are "allocated to a bearer[1] for a station based upon the priority for a service provided over the bearer at the user level of a subscriber."




**B. File History of the '573 Patent**

58. I reviewed the File History of the '573 Patent. Of note, the Examiner found that both (i) receiving a matrix of priorities, where each priority is assigned to

[1] While the '573 patent does not define "bearer," Patent Owner has taken the position that "bearer" encompasses a "connection for a station" in a communication network. *See, e.g.*, Ex. 1013, 1; '573 patent, 1:27–30 ("a user device[] is provided with a circuit switched bearer or a packet switched bearer, or both").

a service and a user subscriber level; and (ii) using the matrix to allocate resources in a communication system were taught by the prior art, and allowed the claims only after they were amended to specify that the "user subscriber levels indicate subscriber value as measured by pricing levels associated therewith." Ex. 1002, 288, 318.

### C. Interpretation of the '573 Patent Challenged Claims

59. For purposes of my analysis in this IPR proceeding, I understand that the terms that appear in the claims of the '573 Patent should be interpreted according to their plain and ordinary meaning under the *Phillips* standard. In determining the ordinary and customary meaning, I understand that the words of a claim are first given their plain meaning that those words would have had to a POSITA at the time of the alleged invention. I also understand that the structure of the claims, the specification and file history also may be used to better construe a claim insofar as the plain meaning of the claims cannot be understood. Moreover, I understand that even treatises and dictionaries may be used, albeit under limited circumstances, to determine the meaning attributed by a POSITA to a claim term at the time of filing. I have followed this approach in my analysis, and for all of the claim terms considered in this declaration, I have applied the plain and ordinary meaning of those terms. I followed this approach in my analysis.

60. I also understand that the words of the claims should be interpreted as

they would have been interpreted by a POSITA at the time the invention was made (not today). For purposes of my analysis here, I have used the May 30, 2008, priority date of the '573 Patent as the date of invention. Without exception, however, my analysis of the proper meaning of the recited claim elements (under the *Phillips* standard) in this declaration would be correct if the date of invention was anywhere in the mid-to-late 2000s.

## VIII. Overview of the Cited References

61. General descriptions provided for the following references and combinations thereof are incorporated into each subsection and mapping of the claims that includes citations to these references.

### A. Pedersen (Ex. 1004)

62. Pedersen describes "a method for performing handover in a communication network," such as a 3GPP UMTS system. Pedersen, 1:9–10, 24–32. In such a network, Pedersen teaches, "[c]ommunication with a subscriber terminal UE [user equipment] having subscribed to said network is performed by the intermediate of at least one network entity known as Node_B . . . handling the communication of said subscriber terminal." *Id.*, 1:41–47. As the "subscriber terminal mov[es] . . . within the network," the subscriber terminal "may be handed over to another such network entity." *Id.*, 1:47–49. This is a "handover." *Id.*, 1:49–50. The handover "is performed under control of a control entity, e.g., RNC, of the

communication network." Pedersen, 4:66–5:3.

63. Sometimes, a subscriber terminal is handed over through a "hard handover (HHO)," in which the subscriber terminal is "connected to only one Node_B" during the handover. *Id.*, 1:62–66. Alternatively, a subscriber terminal is handed over through a "soft-handover (SHO)," in which the subscriber terminal is "connected to two more Node_B's" during the handover. *Id.*, 1:58–62. A "special case of a SHO" is "site selection diversity transmission (SSDT)," which additionally employs "power control for the downlink" to a subscriber terminal. *Id.*, 5:26–29, 7:52–57. "In general," Pedersen explains, "application of SHO makes it possible to have seamless (transparent) handover and improved coverage," but "the price paid for having SHO is a higher average transmit power level from Node_B's[.]" *Id.*, 1:66–2:4.

64. At the time of Pedersen, all subscriber terminals in a cell were typically provided the same handover treatment. *Id.*, 2:61–62. Recognizing "[t]his approach is . . . not optimal," Pedersen teaches selecting a "user specific handover" treatment when handing over a communication from a user's subscriber terminal. *Id.*, 2:62–67, 3:63–65. The selected handover treatment, Pedersen explains, depends on a "traffic class" and a "user class" of the communication from the user's subscriber terminal. *Id.*, 3:14–21.

65. In particular, as shown in annotated Figure 2 below, Pedersen teaches that handover treatment is selected using a "matrix" that "map[s] various user classes per respective traffic class" with "a respectively assigned handover priority." *Id.*, 5:53–56, 6:8–10.

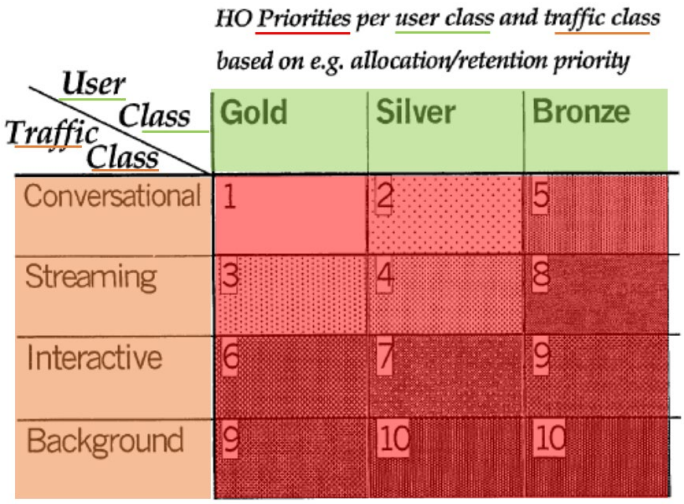



**FIG. 2**

66. The traffic classes may include, for example, "conversational, streaming, interactive, and background" classes of traffic. A user class, Pedersen explains, "is defined by the subscribed QoS profile for the users of this class." *Id.*, 5:63–64. "For example, 'gold' class users have subscribed to the best available QoS in each traffic class, 'silver' class user[s] have subscribed to a lower QoS as compared to the 'gold' class user, and the 'bronze' class users have subscribed to the least good QoS profile as compared to 'gold' and 'silver' class respectively." *Id.*, 5:64–6:2. One example of a subscribed QoS profile in Pedersen is a profile "determined by at least those radio access bearer attributes which are common to all

traffic classes as defined in" a 3GPP technical specification, 3GPP 23.107. *Id.*, 5:35–42. "The subscribed QoS," Pedersen teaches, "will . . . be reflected in the charges that will be charged to the users," meaning "'gold' class users will pay more per bit than 'bronze' class users for services the communication network offers." *Id.*, 6:2–7.

67. The matrix is used to select a handover priority for each communication from a user's subscriber terminal. The handover priority is "applied per user class per traffic class," as shown in Figure 2's matrix, such that "a gold conversational user experiences another handover as compared to a bronze streaming user." *Id.*, 6:43–46. While Figure 2 shows handoff priorities based on an "allocation/retention priority as an example of radio access bearer attributes," Pedersen provides that the priority may be determined by any of—or by more than one of—"those radio access bearer attributes which are common to all traffic classes as defined in" 3GPP 23.107. *Id.*, 6:19–27.

68. By employing such "user specific handover settings," Pedersen explains, numerous "advantages" are achieved, including "optimizing the overall network performance," reducing "overhead," "effectively impos[ing] QoS (Quality of Service) discrimination between different user classes," and "more optimal[ly] us[ing] the different characteristics of the different traffic classes." *Id.*, 3:63–4:34.

## B. The 3GPP Specifications

### 1. 3GPP 23.107

69. 3GPP 23.107 describes a "QoS Concept and Architecture" for a UMTS system like Pedersen's. As 3GPP 23.107 explains, traffic classes—"conversational," "streaming," "interactive," and "background"—have varying QoS requirements, including "how delay sensitive the traffic is[.]" 3GPP 23.107, 13–15. To ensure these QoS requirements are met, these traffic classes have defined bearer attributes used by the UTRAN that "limit the UMTS bearer service which can be provided." *Id.*, 16, Table 2. Bearer attributes discussed in 3GPP 23.107 include guaranteed bit rate (GBR) and maximum bit rate (MBR).

### 2. 3GPP 23.401

70. 3GPP 23.401 describes an additional bearer attribute used by the UTRAN in the UMTS system, "Aggregate Maximum Bit Rate (AMBR)." 23.410, 16. The AMBR "denotes a bit rate of traffic per group of bearers" and "limits the aggregate bit rate that can be expected to be provided by the . . . bearers sharing the AMBR." *Id.*

### 3. 3GPP 23.203

71. 3GPP 23.203 describes a "QoS Class Identifier (QCI) parameter" used by the UTRAN in a UMTS system that "has a 1:1 mapping to a set of QoS parameters defined" in accordance with 3GPP 23.107. 3GPP 23.203, 49.

#### 4. 3GPP 36.300

72. 3GPP 36.300 describes another bearer attribute, "prioritised bit rate (PBR)," that is used alongside GBR, MBR, and AMBR in a E-UTRAN. The PBR "maximises the transmission of higher priority data." 3GPP 36.300, 52.

73. In my opinion, Pedersen and the 3GPP specifications are from the same field of endeavor as the '573 patent, namely, telecommunication networks and, in particular, 3GPP networks. Moreover, each is reasonably pertinent to one of the problems the '573 patent was trying to solve, such as allocating resources to maintain QoS in 3GPP networks. *See e.g.*, '573 patent, 3:8–10, 3:21–23; 3GPP 23.107, 7–8, 11, 18; 3GPP 23.401, 14–16; 3GPP 23.203, 9, 12; 3GPP 36.300, 12, 34–35, 53.

## IX. Claims 1–39 Are Unpatentable

74. As described in the following paragraphs, Pedersen alone and/or in combination with one or more of the 3GPP specifications renders obvious claims 1–39 of the '573 Patent.

### A. Ground 1: Pedersen Renders Obvious Claims 1–4, 6, 14, 16, 18–23, 25, 33, 35, 37, 39

#### 1. Claim 1

75. Pedersen teaches claim 1.

**[1p] A method comprising:**

76. To the extent this preamble is limiting, Pedersen teaches "a method." Pedersen, Abstract.

**[1a] receiving a matrix of priorities, each priority in said matrix being assigned to one of a plurality of services for one of a plurality of user subscriber levels, wherein said user subscriber levels indicate subscriber value as measured by pricing levels associated therewith; and**

77. Pedersen teaches "a matrix of priorities, each priority in said matrix being assigned to one of a plurality of services for one of a plurality of user subscriber levels." Pedersen's Figure 2 is a "matrix" of "HO [handover] priorities." Pedersen, 6:8–10. Pedersen's matrix is shown alongside the '573 patent's matrix below (both annotated).

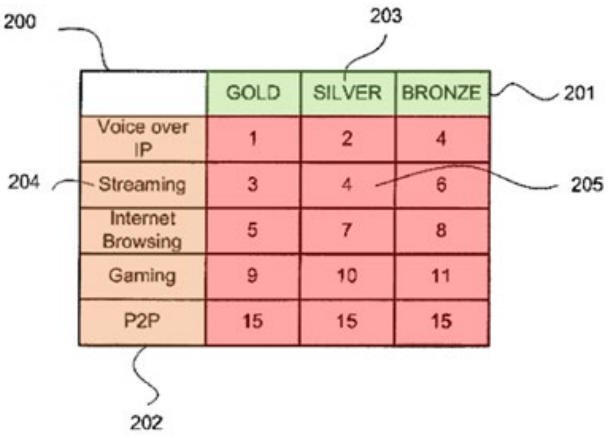



Figure 2

**'573 Patent's Matrix**


FIG. 2

**Pedersen's Matrix**

78. Pedersen's matrix "map[s] various user classes per respective traffic class" with "a respectively assigned handover priority," as shown. *Id.*, 5:53–56, 6:8–

10. A POSITA would recognize Pedersen's traffic classes correspond to the claimed services. The '573 patent simply refers to its traffic classes as services. *Compare* Pedersen, 5:56–58 (listing exemplary traffic classes of "conversational," "streaming," "interactive," and "background") *with* '573 patent, 4:53–58 (listing exemplary services of "Voice over IP," "Streaming," "Gaming," and "peer-to-peer"). A POSITA would likewise recognize Pedersen's user classes correspond to the claimed user subscriber levels. The '573 patent's user subscriber levels "enable differentiation between different groups of subscribers," such as "Gold, Silver and Bronze." '573 patent, 5:17–18. The user subscriber levels may be defined by, for example, "an allocation and retention priority (ARP)." *Id.*, 4:8–9. Likewise, Pedersen's user classes are "distinguishable according to [a] respective subscription profile defining a subscribed quality of service (QoS)," such as "gold, silver, [and] bronze," and may be "determined based on allocation/retention priority." Pedersen, 5:35–42, 5:58–60.

79. Pedersen also teaches "wherein said user subscriber levels indicate subscriber value as measured by pricing levels associated therewith." Just as the '573 patent's Gold, Silver and Bronze user subscriber levels are "offered at a range of different pricing levels," '573 patent, 6:47–49, Pedersen's user classes are "reflected in the charges that will be charged to the users," meaning "'gold' class users will pay more per bit than 'bronze' class users for services the communication

network offers," Pedersen, 6:2–7. And just as in the '573 patent, where Gold user subscriber level subscribers have the "highest" value and Bronze user subscriber level subscribers the lowest, '573 patent, 5:6–7, in Pedersen "'gold' class users have subscribed to the best available QoS in each traffic class, 'silver' class user[s] have subscribed to a lower QoS as compared to the 'gold' class user, and the 'bronze' class users have subscribed to the least good QoS profile as compared to 'gold' and 'silver' class respectively," Pedersen, 5:64–6:2.

80. It would have been obvious to a POSITA from Pedersen that the matrix is "received." In the '573 patent, the matrix is "receiv[ed]" at a Radio Resource Management (RRM) network element. This receipt is not limited to receipt from another network entity, but rather encompasses receipt simply from the RRM's own memory. '573 patent, 5:23–25. As shown in Figure 4 below, the "receiving unit 404 (or other receiving means)" at the RRM is "for receiving the matrix either from the memory 403, from another network element in the communications system or from another element." *Id.*, 6:36–39.

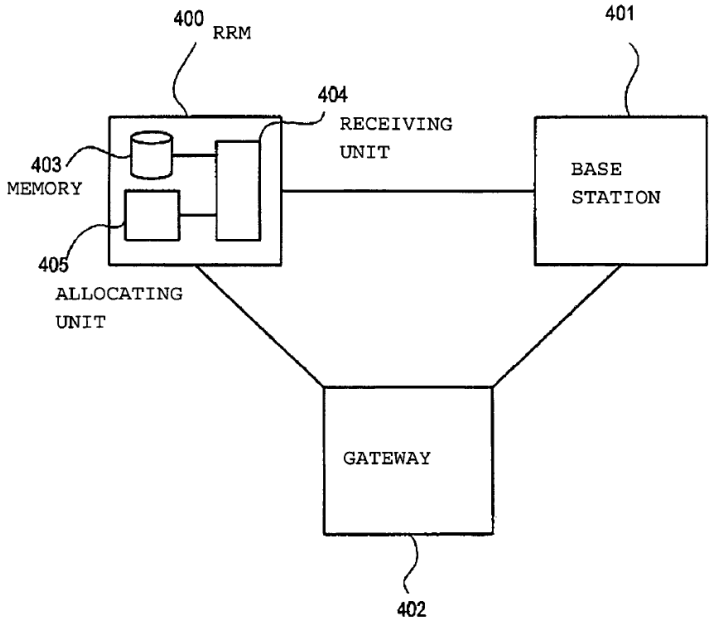



Figure 4

81. Similarly, in Pedersen, the "handover procedure," and thus use of the matrix, "is performed under control of a control entity, e.g., RNC, of the communication network." Pedersen, 4:66–5:3. Pedersen also teaches that the matrix is "configured" and the priorities of the matrix are "defined by the network operator." *Id.*, 5:43–51, 6:27–30. It would have been obvious to a POSITA that, whether "configured" and "defined" at the RNC or at another entity, Pedersen's matrix, like that of the '573 patent, is "received." If Pedersen were implemented such that the matrix was "configured" and "defined" at the RNC, it would have been obvious to a POSITA that Pedersen's RNC, configured to use the matrix as Pedersen describes, would include a memory storing the matrix, and the RNC would "receive" the matrix from memory. *See, e.g.*, Ex. 1015, 4:65–5:1 ("The radio network controller []

typically includes a digital signal processor and software for executing computer processes stored on a computer readable medium."). A POSITA would have recognized that receiving the entire matrix (and not merely data therein) from the memory would allow the processor to simply and efficiently access the data therein. If Pedersen were implemented such that the matrix was "configured" and "defined" at another network entity, it would have been obvious to a POSITA that Pedersen's RNC, configured to use the matrix as Pedersen describes, would "receive" the matrix from that other entity. *See, e.g.*, Ex. 1015, 5:1–5 ("[T]he radio network controller [] typically includes connecting means for communicating with other network elements, such as other radio network controllers and/or base transceiver stations, but also with the core network[.]"). For example, such an implementation would be obvious because it would allow for configuration and definition by the network operator of the matrix to occur at one RNC but use of the matrix to occur at all other RNCs as well, making configuration and definition more efficient for the network operator. Ex. 1011, 213–14. A POSITA would have recognized that transmitting the matrix (and not merely data to create the matrix) between RNCs would allow the same matrix to be simply and efficiently transmitted to and received at multiple RNCs, without each RNC expending resources to construct the matrix. Both implementations—receipt from memory or receipt from another network entity—would have been within the skill of a POSITA and would have yielded nothing more

than predictable results, giving a POSITA a reasonable expectation of success. *See, e.g.,* Ex. 1015, 4:65–5:5. In either of these implementations, Pedersen's RNC "receives" the matrix.

82. Because a POSITA would thus understand Pedersen to teach a matrix of priorities, each priority being assigned to one of a number of traffic classes and one of a number of user classes, each corresponding to a subscribed QoS profile and price, and would have found it obvious that Pedersen's RNC, configured to use the matrix as Pedersen describes, would receive the matrix either from memory or from another entity in the UMTS system, Pedersen teaches "receiving a matrix of priorities, each priority in said matrix being assigned to one of a plurality of services for one of a plurality of user subscriber levels, wherein said user subscriber levels indicate subscriber value as measured by pricing levels associated therewith."

**[1b] allocating resources to a bearer for a station of the communication system based at least in part upon the priority assigned to a service provided over the bearer at the user subscriber level associated with a subscriber.**

83. Pedersen teaches "allocating resources to a bearer for a station of the communication system based at least in part upon the priority assigned to a service provided over the bearer at the user subscriber level associated with a subscriber." In Pedersen, a handover is effected by the RNC based on the priority "applied per user class per traffic class," as shown in Figure 2's matrix, and "each HO [handover]

priority signifies that a user of the concerned user class when communicating in a respective traffic class is treated in a specific manner as regards handover." Pedersen, 5:46–51, 6:34–36, 6:43–46. Thus, "a gold conversational user experiences another handover as compared to a bronze streaming user." *Id.*, 6:43–46. Thus, Pedersen teaches that the RNC effects a handover for a user's subscriber terminal, *id.*, 1:15–20, based on the priority assigned to the traffic class of the user's communication at the user class associated with the user.

84. A POSITA would have understood from Pedersen that the user's communication is "provided over [a] bearer" for the user's subscriber terminal, and that the user's subscriber terminal is "a station of the communication system." Pedersen describes a "UMTS network" that relies on "WCDMA (Wideband Code Divisional Multiple Access)" in which the subscriber terminal "UE [user equipment]" communicates with the network through a "network entity known as a Node_B," and a handover is "performed under control of a control entity" such as the RNC. Pedersen. 1:37–47, 4:66–5:3. A POSITA would have understood the communication between the Node_B and the subscriber terminal UE in Pedersen to be "provided over [a] bearer" because it is provided over the connection between the Node_B and the subscriber terminal. In my opinion, this is also consistent with what Patent Owner has previously said about "bearer for a station." Ex. 1013, 1 (proposing "bearer for a station" is a "connection for a station").

85. The handover effected based on the matrix is an allocation of resources in each of two ways: (i) the handover is an allocation of power, because differing handover treatments require differing transmit powers for the bearer between the Node_B and the subscriber terminal, and (ii) establishment of the bearer between the Node_B and the subscriber terminal requires allocating resources to that bearer to ensure requested QoS parameters are met.

86. Regarding (i), Pedersen explains that soft handover ("SHO") requires "a higher transmit power level" for a bearer between a Node_B and a subscriber terminal than is required for hard handover ("HHO"). Pedersen, 2:1–4. Thus, in effecting the handover, power is allocated to the bearer differently for a SHO than for a HHO. In this way, Pedersen teaches allocating power to a bearer for the subscriber terminal based on Pedersen's matrix.

87. Regarding (ii), a POSITA would have recognized that, in effecting a handover in a UMTS system as Pedersen describes, a bearer is established between the Node_B and the subscriber terminal, and establishment of the bearer requires an allocation of resources to the bearer. This is because, as a POSITA would know, at establishment, each bearer is allocated with certain resources to ensure requested QoS parameters are met. In particular, as explained in Section VI.C, when a bearer is established, as during a handover, the subscriber terminal requests certain QoS parameters for the bearer to ensure the bearer is optimized for the QoS requirements

of the particular traffic to be sent over the bearer. Ex. 1011, 177, 402; Ex. 1012, 12 (3GPP defining "handover" as "[t]he process in which the radio access network changes the radio transmitters . . . used to provide the bearer services, *while maintaining a defined bearer service QoS*."). Resources are then allocated to the bearer to ensure the requested QoS parameters can be met. Ex. 1011, 177. Thus, a POSITA would have understood, in establishing the bearer between the Node_B and the subscriber terminal during a handover to meet the subscriber terminal's requested QoS parameters, resources would be allocated by Pedersen's RNC to the bearer. Pedersen at 2:39–41 ("a handover procedure is performed under control of . . . the RNC"); Ex. 1012, 21 (3GPP defining "radio network controller" as the "equipment . . . in charge of controlling the use . . . of the radio resources."). *See also* Ex. 1011, 165 ("[A]n RB [radio bearer] uses a certain amount of radio resources from the network and these resources are quite limited."); *id.* at 306 (Each RB has "different capabilities for data transfer" that "are based on [] requested QoS parameters."); *id.* ("[E]ach RB uses some radio resources"); *id.* at 410 ("The network operator allocates and manages the required bandwidth according to requested QoS parameters.").

88. Because Pedersen thus teaches effecting a handover to a Node_B for a user's subscriber terminal based on the priority assigned to the traffic class of the user's communication at the user class associated with the user, and a POSITA

would have understood that effecting the handover is an allocation of resources to a bearer between the Node_B and the subscriber terminal, Pedersen teaches "allocating resources to a bearer for a station of the communication system based at least in part upon the priority assigned to a service provided over the bearer at the user subscriber level associated with a subscriber."

**2. Claim 2: The method as claimed in claim 1, wherein the subscriber is associated with the station.**

89. Pedersen teaches "the subscriber is associated with the station." In Pedersen, the subscriber, called a "user," is "a user of [the] subscriber terminal." Pedersen, 1:15–20.

**3. Claim 3: The method as claimed in claim 1, wherein the station is a user equipment.**

90. Pedersen teaches "the station is a user equipment." Pedersen's subscriber terminal is also described as a "user equipment[] UE." Pedersen, 1:24–32.

**4. Claim 4: The method as claimed in claim 1, wherein the communications system is a cellular system.**

91. Pedersen teaches "the communications system is a cellular system." A POSITA would have understood Pedersen's UMTS system to be a "cellular system." Pedersen, 1:24–32.

### 5. Claim 6: The method as claimed in claim 1, wherein the resources include time, power, codes, or frequencies.

92. Pedersen teaches "the resources include . . . power, codes, or frequencies." As explained in [1b], Pedersen teaches that the handover is an allocation of power, because differing handover treatments require differing transmit powers for the bearer between the Node_B and the subscriber terminal. As further explained in [1b], a POSITA would have understood that Pedersen's handover involves establishment of the bearer between the Node_B and the subscriber terminal, and this requires allocating resources to the bearer between the Node_B and the subscriber terminal. Because Pedersen's network relies on WCDMA, which a POSITA would have understood uses a range of frequency bands and codes, a POSITA would have known that allocating resources to the bearer involves allocating both frequencies and a code to the bearer. *See, e.g.*, Ex. 1011, 10 (describing "frequency bands" of a WCDMA system), 25–27 (describing allocating "codes" and "frequency channels" to signals).

### 6. Claim 14: The method as claimed in claim 1, wherein the step of allocating the resources is performed by a Radio Resource Management (RRM) network element of the communications system.

93. Pedersen teaches that the "allocating" is performed by a Radio Resource Management (RRM) network element." In Pedersen, the "handover procedure," and thus the allocation of resources (*see* [1b]), "is performed under

control of a control entity such as the RNC of the communication network." Pedersen, 2:39–41. A POSITA would have understood Pedersen's RNC to be a "Radio Resource Management" network element because the RNC manages radio resources, including power, codes, and frequencies (*see* [6]). *See, e.g.*, Ex. 1012, 21 (3GPP defining "radio network controller" as the "equipment . . . in charge of controlling the use . . . of the radio resources."). *See also* Ex. 1014, 3:58–64 (characterizing the "[RNC] in WCDMA networks" as an "element[] which [is] handling radio resource management"); Ex. 1016, [0007] (describing a "radio network controller . . . for use in radio resource management (RRM) functions").

**7. Claim 16: The method as claimed in claim 1, wherein the user subscriber levels are ranked from high value to low value.**

94. Pedersen teaches "the user subscriber levels are ranked from high value to low value." Just like the '573 patent's Gold, Silver and Bronze user subscriber levels, Pedersen's user classes are "distinguishable according to [a] respective subscription profile defining a subscribed quality of service (QoS)," such as "gold, silver, [and] bronze." Pedersen, 5:35–42, 5:58–60. And just as in the '573 patent, where Gold user subscriber level subscribers have the "highest" value and Bronze user subscriber level subscribers the lowest, '573 patent, 5:6–7, in Pedersen "'gold' class users have subscribed to the best available QoS in each traffic class, 'silver' class user[s] have subscribed to a lower QoS as compared to the 'gold' class user,

and the 'bronze' class users have subscribed to the least good QoS profile as compared to 'gold' and 'silver' class respectively," Pedersen, 5:64–6:2.

**8. Claim 18: The method as claimed in claim 1, wherein the user subscriber level is defined by an allocation and retention priority (ARP) of the bearer.**

95. Pedersen teaches "the user subscriber level is defined by an [ARP] of the bearer." Just as the user subscriber levels of the '573 patent may be defined by "an allocation and retention priority (ARP)" of a bearer, '573 patent, 4:8–9, Pedersen's user classes may be "determined based on allocation/retention priority" of the bearer. Pedersen, 5:35–42, 5:58–60; 3GPP23.107, 18 (identifying ARP as an attribute of a bearer). While Pedersen uses the phrase "allocation *and* retention priority" (emphasis added) and the '573 patent uses the phrase "allocation/retention priority," a POSITA would have understood these terms to be synonymous, as both were used to refer to the attribute commonly abbreviated as ARP.

**9. Claim 19: A computer program product stored on a non-transitory computer usable medium, comprising a computer program arranged for effecting the method of claim 1.**

96. Pedersen teaches the method of claim 1, *see* [1], may be carried out at an RNC. Pedersen, 4:66–5:3. And a POSITA would have known that RNC's like that in Pedersen "typically include[] a digital signal processor and software for executing computer processes stored on a computer readable medium." *See, e.g.*, Ex. 1015, 4:65–5:1(another patent assigned to the same company as Pedersen

describing an RNC likewise used for handovers). Thus, a POSITA would have known that Pedersen's RNC would include a "computer program product stored on a non-transitory computer usable medium, comprising a computer program arranged for effecting" this method, or would have at least found such inclusion to be obvious," as this would have been the typical implementation of an RNC within the skill of a POSITA and would have yielded nothing more than predictable results. *See, e.g.*, Ex. 1015, 4:65–5:1. Such an implementation would have been straightforward, simple, and effective, making it not only an obvious implementation but also a desirable one that was, accordingly, common in RNCs.

**10. Claim 20**

97. Pedersen teaches claim 20.

**[20p] An apparatus comprising:**

98. To the extent this preamble is limiting, Pedersen teaches "[a]n apparatus." Pedersen describes an RNC. Pedersen, 4:66–5:3.

**[20a] one or more processors; and one or more memories including computer program code, the one or more memories and the computer program code configured, with the one or more processors, to cause the apparatus to perform at least the following:**

99. Pedersen's RNC is configured to perform the steps [20b] and [20c] below. *See* [1]; Pedersen, 4:66–5:3. And a POSITA would have known that RNC's like that in Pedersen "typically include[] a digital signal processor and software for

executing computer processes stored on a computer readable medium." *See, e.g.*, Ex. 1015, 4:65–5:1 (another patent assigned to the same company as Pedersen describing an RNC likewise used for handovers). Thus, a POSITA would have known that, to perform these steps, Pedersen's RNC would include "one or more processors" and "one or more memories including computer program code," and "the one or more memories and the computer code [would be] configured, with the one or more processors, to cause" Pedersen's RNC to perform these steps, or at least would have found such inclusion to be obvious, as this would have been a typical implementation of an RNC within the skill of a POSITA and would have yielded nothing more than predictable results. *Id.*; *see, e.g.*, Ex. 1015, 4:65–5:1 ("The radio network controller [] typically includes a digital signal processor and software for executing computer processes stored on a computer readable medium.").

**[20b] receiving a matrix of priorities, each priority in said matrix being assigned to one of a plurality of services for one of a plurality of user subscriber levels, wherein said user subscriber levels indicate subscriber value as measured by pricing levels associated therewith; and**

100. Pedersen teaches this limitation. *See* [1a].

**[20c] allocating resources to a bearer for a station of the communication system based at least in part upon the priority assigned to a service provided over the bearer at the user subscriber level associated with a subscriber.**

101. Pedersen teaches this limitation. *See* [1b].

### 11. Claim 21–23, 25, 33, 35, and 37.

102. These claims all depend from claim 20, which Pedersen teaches. *See* [20]. Pedersen also teaches the additional features of these claims. *See* [2-4], [6], [14], [16], [18].

### 12. Claim 39

**[39p]: A method comprising:**

103. To the extent this preamble is limiting, Pedersen teaches "a method." Pedersen, Abstract.

**[39a]: generating a matrix of priorities, each priority in said matrix being assigned to one of a plurality of services for one of a plurality of user subscriber levels, wherein said user subscriber levels indicate subscriber value as measured by pricing levels associated therewith; and**

104. Pedersen teaches "a matrix of priorities, each priority in said matrix being assigned to one of a plurality of services for one of a plurality of user subscriber levels, wherein said user subscriber levels indicate subscriber value as measured by pricing levels associated therewith." *See* [1a].

105. Pedersen also teaches "generating" the matrix. In Pedersen, the matrix is "configured." Pedersen, 5:43–51. For example, Pedersen teaches that the priorities of the matrix are "defined by the network operator." *Id.*, 6:27–30. A POSITA would have understood such "configur[ing]" and "defin[ing]" to be "generating" the matrix.

**[39b]: transmitting the matrix.**

106. It would have been obvious to a POSITA from Pedersen that the matrix is "transmitt[ed]." As explained in [1a], in the '573 patent the matrix is "receiv[ed]" at a Radio Resource Management (RRM) network element either from another network entity or from the RRM's own memory. '573 patent, 5:23–25, 6:36–39, Figure 4. From this, a POSITA would have understood that the matrix could be "transmitt[ed]" to the RRM from either another network entity or the RRM's own memory.

107. In Pedersen, the matrix is "configured" and the priorities of the matrix are "defined by the network operator[.]" *Id.*, 5:43–51, 6:27–30. It would have been obvious to a POSITA that, whether "configured" and "defined" at the RNC or at another entity, Pedersen's matrix, like that of the '573 patent, is "transmitted." If Pedersen were implemented such that the matrix was "configured" and "defined" at another network entity, it would have been obvious to a POSITA that Pedersen's RNC, configured to use the matrix as Pedersen describes, would "receive" the matrix from that other network entity, meaning that other network entity "transmitted" the matrix. *See, e.g.*, Ex. 1015, 5:1–5 ("[T]he radio network controller [] typically includes connecting means for communicating with other network elements, such as other radio network controllers and/or base transceiver stations, but also with the core network[.]"); Ex. 1011, 206–209 (showing RNC communicatively coupled to

other network elements, including a "Mobile Switching Center" whose functions include "Dynamic Allocation of Resources"). For example, such an implementation would be obvious because it would allow for configuration and definition by the network operator of the matrix to occur at one RNC or other network entity but use to occur at all other RNCs, making configuration and definition more efficient for the network operator. Ex. 1011, 213–14. A POSITA would have recognized that transmitting the matrix (and not merely data to create the matrix) between RNCs would allow the same matrix to be simply and efficiently transmitted to and received at the other RNCs, without each RNC expending resources to construct the matrix. If Pedersen were implemented such that the matrix was "configured" and "defined" at the RNC, it would have been obvious to a POSITA that Pedersen's RNC, configured to use the matrix as Pedersen describes, would include a memory storing the matrix, and the RNC would "receive" the matrix from the memory, meaning the memory would "transmit" the matrix. *See, e.g.*, Ex. 1015, 4:65–5:1 ("The radio network controller [] typically includes a digital signal processor and software for executing computer processes stored on a computer readable medium."). A POSITA would have recognized that transmitting the entire matrix (and not merely data therein) from the memory would allow the processor to simply and efficiently access the data therein. Both implementations—transmission from memory or transmission from another network entity—would have been within the skill of a POSITA and

would have yielded nothing more than predictable results, giving a POSITA a reasonable expectation of success. *See, e.g.,* Ex. 1015, 4:65–5:5. In either of these implementations, Pedersen's matrix is "transmitt[ed]."

### B. Ground 2: Pedersen and 3GPP23.107 Render Obvious Claims 1–8, 11, 13–16, 18–27, 30, 32–35, 37–39

108. As explained in Section VI, by 2008 3GPP was the primary player in the development of third-generation systems, and the 3GPP technical specifications for the UMTS system prescribed implementation details for all aspects of the system. *See, e.g.*, Ex. 1011, 9 (3GPP included "the most important companies in telecommunications" and, in 2003, was the "organization that bears the greatest responsibility for the 3G development work."); Ex. 1020, ¶26 ("3GPP is the world's leading organization for developing and maintaining cellular telecommunications standards"). For this reason, by that time, those implementing a UMTS system would have been familiar with the 3GPP technical specifications as a resource. Ex. 1020, ¶33 ("I would expect any person implementing a cellular network or device, e.g., a UMTS network, to consult the corresponding specifications on the 3GPP ftp server, as well as other related documents."); Ex. 1011, 491–508 (listing 3GPP technical specifications as a reference), 515 (describing 3GPP standards are "the most widely used 3G standards"). Indeed, Pedersen specifically envisions implementing its handover procedure in a 3GPP UMTS network. Pedersen, 1:37–

40. Accordingly, by 2008, a POSITA seeking to implement Pedersen would have been motivated and found it obvious to implement Pedersen's UMTS system according to the implementation details set forth in the 3GPP technical specifications, and the POSITA would have had a reasonable expectation of success in doing so.

109. A POSITA would have been motivated not only by the 3GPP technical specifications' role as a primary resource for those implementing UMTS networks, but also by Pedersen's recommendation to use a specific 3GPP technical specification, 3GPP23.107: Pedersen specifically recommends implementing its matrix using "subscription profile[s]" in which a "subscribed quality of service (QoS)" is defined by the bearer attributes specified in a particular 3GPP technical specification, 3GPP23.107. Pedersen, 5:38–42. This citation to 3GPP23.107 would have led a POSITA directly to the 3GPP technical specifications—technical specifications the POSITA would have recognized are designed to be used together in the design and implementation of a UMTS network. Ex. 1020, ¶¶35–36 (describing how a POSITA would locate 3GPP technical specifications in any of the series).

110. A POSITA would have found it obvious to implement Pedersen's UMTS system according to the implementation details set forth in the 3GPP technical specifications, and a POSITA would have had a reasonable expectation of success in doing so, because this was the very purpose of the 3GPP technical

specifications, and POSITAs commonly referenced the 3GPP technical specifications in the design and implementation of UMTS systems. Ex. 1020, ¶33 ("The whole purpose of 3GPP creating and making these specifications available was so that engineers and other individuals would have ready access to them when developing and implementing cellular networks and devices."); Ex. 1011, 6 ("[T]he goal of [3GPP] is to produce the specifications for a 3G system" and 3GPP "bears the greatest responsibility for the 3G development work."). *See also, e.g.,* Ex. 1023 (patent publication recommending implementation of UMTS network by reference to 3GPP technical specifications); Ex. 1011, 491–508 (reference book listing 3GPP technical specifications as a reference), 515 (describing 3GPP standards are "the most widely used 3G standards"). A POSITA would have found it particularly obvious, and would have had a particular expectation of success, implementing Pedersen's UMTS system according to 3GPP23.107, as this 3GPP technical specification is specifically recommended by Pedersen for implementation. Pedersen, 5:38–42.

**1. Claims 1–4, 6, 14, 16, 18–23, 25, 33, 35, 37, and 39**

111. As discussed in Ground 1, Pedersen teaches claims 1–4, 6, 14, 18–23, 25, 33, 35, 37, and 39. Because the combination of Pedersen and 3GPP23.107 would retain the aspects of Pedersen relied on in Ground 1, the combination teaches these claims for the same reasons discussed in Ground 1, and they are further taught by

3GPP23.107, as explained herein.

### 2. Claim 5: The method as claimed in claim 1, wherein allocating resources includes setting a bit rate provided for the bearer.

112. Pedersen and 3GPP23.107 teach "allocating resources includes setting a bit rate provided for the bearer." As explained in [1b], a POSITA would have understood that effecting a handover to a Node_B for a user's subscriber terminal in a UMTS system, as Pedersen teaches, according to the 3GPP technical specifications is an allocation of resources to a bearer between the Node_B and the subscriber terminal, and that the resources are allocated to ensure QoS parameters requested by the subscriber terminal are met. In implementing Pedersen based on 3GPP23.107, as Pedersen recommends, allocating these resources would, a POSITA would recognize, "include[] setting a bit rate provided for the bearer."

113. This is because, as explained in Section VI, resources are allocated to the bearer by the RNC in accordance with requested QoS parameters to ensure the bearer is optimized for the QoS requirements of the particular traffic to be sent over the bearer. Ex. 1011, 177, 402. *See also* Ex. 1012, 12 (3GPP defining "handover" as "[t]he process in which the radio access network changes the radio transmitters . . . used to provide the bearer services, *while maintaining a defined bearer service QoS*."). As 3GPP23.107 explains, traffic classes have varying QoS requirements, including "how delay sensitive the traffic is[.]" 3GPP23.107, 14–15. To ensure

optimization of a bearer for a particular traffic class, the QoS requirements for the traffic class are reflected in the requested QoS parameters, which 3GPP23.107 calls "bearer attributes" in 3GPP23.107. *Id.*, 16. Pedersen specifically envisions effecting handovers based on such bearer attributes. Pedersen, 5:38–40 (describing "bearer attributes which are common to all traffic classes as defined in 3GPP 23.107"); *id.*, 6:21–25; As 3GPP23.107 explains, these bearer attributes "describe the service provided by the UMTS network to the user of the UMTS bearer service." 3GPP23.107, 16.

114. Several of these bearer attributes pertain to bit rates. The "maximum bitrate" bearer attribute, for example, defines the "maximum number of bits delivered by UMTS and to UMTS . . . within a period of time, divided by the duration of the period," while the "guaranteed bitrate" bearer attribute defines the "guaranteed number of bits delivered by MTS within a period of time (provided that there is data to deliver), divided by the duration of the period." *Id.* These bearer attributes, including those pertaining to bit rates, "limit the UMTS bearer service which can be provided." *Id.*

115. Thus, Pedersen envisions effecting handovers based on the bearer attributes of 3GPP23.107. Pedersen, 5:38–40. Because effecting a handover includes allocating resources to a bearer between the Node_B and the subscriber terminal, *see* [1b], a POSITA would have understood Pedersen and 3GPP23.107 to teach

allocating resources to the bearer based on the bearer attributes of 3GPP23.107. And because some of the bearer attributes in 3GPP23.107 specify bit rates that limit the UMTS bearer service that can be provided, from Pedersen and 3GPP23.107, a POSITA would have recognized that, allocating resources based on the bearer attributes of 3GPP23.107, as Pedersen envisions, would involve "setting a bit rate provided for the bearer" that accords with the bearer attributes specifying bit rates. Thus, Pedersen and 3GPP23.107 teach that "allocating resources includes setting a bit rate provided for the bearer."

**3. Claim 7: The method as claimed in claim 5, wherein at least one service includes a guaranteed bit rate (GBR) and, in the step of allocating resources, the resources are allocated to provide the guaranteed bit rate for the bearer over which that service is provided.**

116. Pedersen and 3GPP23.107 teach that "at least one service includes a guaranteed bit rate (GBR)." As explained in [1a], Pedersen's traffic classes correspond to the claimed services. 3GPP23.107 explains that a traffic class, also called a "QoS class" in 3GPP23.107, has an associated GBR. 3GPP23.107, 13. In implementing Pedersen based on 3GPP23.107, as Pedersen recommends, the step of allocating the resources for traffic in a particular traffic class would, a POSITA would recognize, involve "the resources [being] allocated to provide the [GBR] for the bearer over which" the traffic in that particular traffic class is provided.

117. This is because, as explained in [5], Pedersen envisions allocating

resources based on the bearer attributes described in 3GPP23.107, and one of these bearer attributes is GBR. 3GPP23.107, 16. For the GBR bearer attribute, the 3GPP23.107 explains that the "[m]inimum resource requirement" for communications in both the conversational and streaming traffic classes "is determined by [the] guaranteed bitrate." *Id.*, 18; *see also id.*, 16 (defining guaranteed bit rate as "guaranteed number of bits delivered by UMTS . . . within a period of time (provided that there is data to deliver), divided by the duration of the period").

118. 3GPP23.107 further explains that the GBR bearer attribute is "include[d]" by the traffic class, as 3GPP23.107 teaches that certain traffic classes have associated bearer attributes, including GBR. For the "conversational" and "streaming" traffic classes, for example, one of the associated bearer attributes is a "guaranteed bitrate." *Id.*, 18, Table 2; '573 patent, 2:37–38 (describing usage of GBR in Background section).

119. Thus, Pedersen envisions allocating resources to a bearer between the Node_B and the subscriber terminal based on the bearer attributes of 3GPP23.107, *see* [1b], [5], and in 3GPP23.107 the conversational and streaming classes have an associated GBR that specifies a "[m]inimum resource requirement" for these traffic classes. Thus, from Pedersen and 3GPP23.107, a POSITA would have recognized that allocating resources based on the bearer attributes of 3GPP23.107, as Pedersen envisions, would involve allocating the resources "to provide the [GBR] for the

bearer over which" traffic in that traffic class is provided.

120. Because Pedersen and 3GPP23.107 thus teach that Pedersen's conversational and streaming traffic classes each have an associated GBR, and that the resources are allocated to provide that associated GBR for the bearer over which conversational or streaming traffic is provided, Pedersen and 3GPP23.107 teach that "at least one service includes a guaranteed bit rate (GBR) and, in the step of allocating resources, the resources are allocated to provide the guaranteed bit rate for the bearer over which that service is provided."

**4. Claim 8: The method as claimed in claim 5, wherein at least one service includes a maximum bit rate (MBR) and, when the resources have been allocated for all bearers, surplus resources are allocated up to the maximum bit rate for the bearer over which that service is provided.**

121. Pedersen and 3GPP23.107 teach that "at least one service includes a maximum bit rate (MBR)." As explained in [1a], Pedersen's traffic classes correspond to the claimed services. 3GPP23.107 explains that a traffic class has an associated MBR. 3GPP23.107, 13 ("QoS classes, also referred to as traffic classes . . ."). In implementing Pedersen based on 3GPP23.107, as Pedersen recommends, allocating the resources for traffic in a particular traffic class would, a POSITA would recognize, involve "when the resources have been allocated for all bearers," allocating "surplus resources . . . up to the [MBR] for the bearer over which" the traffic in that particular traffic class is provided.

122. This is because, as explained in [5], Pedersen envisions allocating resources based on the bearer attributes described in 3GPP23.107, and one of these bearer attributes is "maximum bit rate." 3GPP23.107, 16. The maximum bit rate bearer attribute, the 3GPP23.107 explains, "specifies the upper limit of the bitrate with which the UMTS bearer delivers" the traffic. *Id.*, 18.

123. 3GPP23.107 further explains that the MBR bearer attributes is "include[d]" by the traffic class, as 3GPP23.107 teaches that certain traffic classes have associated bearer attributes, including MBR. For the "conversational" and "streaming" traffic classes, for example, one of the associated bearer attributes is a "maximum bitrate." *Id.*, 18, Table 2; '573 patent, 2:39–43 (describing usage of MBR in Background section).

124. Thus, Pedersen envisions allocating resources to a bearer between the Node_B and the subscriber terminal based on the bearer attributes of 3GPP23.107, *see* [1b], [5], and in 3GPP23.107 the conversational and streaming classes have an associated MBR that "specifies the upper limit of the bitrate with which the UMTS bearer delivers" the traffic for these traffic classes. Thus, from Pedersen and 3GPP23.107, a POSITA would have recognized that allocating resources based on the bearer attributes of 3GPP23.107, as Pedersen envisions, would involve allocating the resources in accordance with this upper limit for traffic in these traffic classes.

125. A POSITA would have recognized from 3GPP23.107's teaching of the

MBR that, "when the resources have been allocated for all bearers, surplus resources are allocated up to the [MBR] for [a] bearer over which" traffic in a particular traffic class is provided. This is because both the "[m]aximum and guaranteed bitrate attributes are used for resource allocation within UMTS," and the "[m]inimum resource requirement" for a bearer "is determined by [the] guaranteed bitrate." *Id.*, 18. From this, a POSITA would have understood that, once resources have been allocated to ensure each bearer's GBR is met, surplus resources would be allocated but not in excess of any bearer's MBR, as the MBR for a traffic class "specifies the upper limit of the bitrate with which the UMTS bearer delivers" the traffic for that traffic class.

126. Because Pedersen and 3GPP23.107 thus teach that Pedersen's conversational and streaming traffic classes each have an associated MBR, and that when resources remain after all bearers' GBRs have been met, the remaining resources are allocated but not in excess of any bearer's MBR, Pedersen and 3GPP23.107 teach that "at least one service includes a maximum bit rate (MBR) and, when the resources have been allocated for all bearers, surplus resources are allocated up to the maximum bit rate for the bearer over which that service is provided."

**5. Claim 11: The method as claimed in claim 7, wherein the GBR is for the bearer in one of the uplink direction, the downlink direction, or both the uplink and the downlink directions.**

127. Pedersen and 3GPP23.107 teach "the GBR is for the bearer in one of the uplink direction, the downlink direction, or both the uplink and the downlink directions." As explained in [7], Pedersen and 3GPP23.107 teach that Pedersen's conversational and streaming traffic classes each have an associated guaranteed bit rate, and that the resources are allocated to provide that associated guaranteed bit rate for the bearer over which a conversational or streaming communication is provided. 3GPP23.107 explains that both "[u]ni-directional and bi-directional bearer services" are supported, and "the attribute[] . . . Guaranteed bit rate should be possible to set separately for uplink/downlink in order to support [such] asymmetric bearers." *Id.* 15. From this, a POSITA implementing Pedersen based on 3GPP23.107, as Pedersen recommends, would have been motivated and found it obvious to employ the GBR for each bearer in one or both of the uplink and downlink directions. A POSITA would have had a reasonable expectation of success in doing so, as the UMTS system prescribed by 3GPP23.107 is designed to support both uplink and downlink GBR, and employing the GBR this way would have been within the skill of a POSITA. *Id.*

### 6. Claim 13: The method as claimed in claim 1, wherein the service provided over the bearer is ascertained by a gateway of the communications system.

128. Pedersen and 3GPP23.107 teach "a gateway of the communications system." Pedersen envisions a UMTS system, and it would have been obvious to a POSITA from 3GPP23.107 that such a UMTS system would include a "gateway." 3GPP23.107 describes, in a UMTS system like Pedersen's, a "CN Gateway" connects the UMTS system to an external network, 3GPP23.107, 9-10. Because 3GPP23.107 thus teaches including a CN gateway in a UMTS system, a POSITA implementing Pedersen's UMTS system according to 3GPP23.107 would have found it obvious to include a CN gateway, and would have had a reasonable expectation of success in doing so.

129. Pedersen and 3GPP23.107 teach that "the service provided over the bearer is ascertained by" the CN gateway, because the CN gateway ascertains the traffic class. As shown in 3GPP23.107's figure below, the CN gateway provides a "UMTS Bearer Service in the direction of the UMTS network and provides an "External Bearer Service" in the direction of the subscriber terminal ("TE" or "terminal equipment"). *Id.*, 9. Nevertheless, QoS is provided "End-to-End," which means "from a Terminal Equipment (TE) to another TE" and, thus, across the External Bearer Service as well. As part of ensuring such End-to-End QoS, 3GPP23.107 explains, the CN gateway "translates the UMTS bearer service

attributes into the external bearer service attributes" and vice versa. *Id.*, 12. Within the UMTS network, QoS is ensured by allocating resources based on the bearer attributes described in 3GPP23.107, as explained in [5]. One such UMTS bearer attribute in need of translation is the "traffic class" bearer attribute which, 3GPP23.107 explains, indicates the "type of application," namely, "conversational," "streaming," "interactive," or "background." *Id.*, 16. A POSITA would have understood that, to translate between the UMTS traffic class bearer attribute and a corresponding external bearer service attribute, the CN gateway would "ascertain[]" the traffic class. From this, a POSITA implementing Pedersen based on 3GPP23.107, as Pedersen recommends, would have been motivated and found it obvious to employ a CN gateway that, in order to translate between the UMTS traffic class bearer attribute and a corresponding external bearer service attribute, as 3GPP23.107 teaches, "ascertain[s]" the traffic class. For example, it would be obvious to a POSITA that, for an uplink bearer, the CN gateway would translate the external bearer service attributes into the corresponding UMTS bearer attributes, including, for example, the UMTS traffic class bearer attribute. A POSITA would have had a reasonable expectation of success in implementing the CN gateway this way, as implementation of a UMTS network including a CN gateway was within the skill of a POSITA and is prescribed by the 3GPP technical specifications.

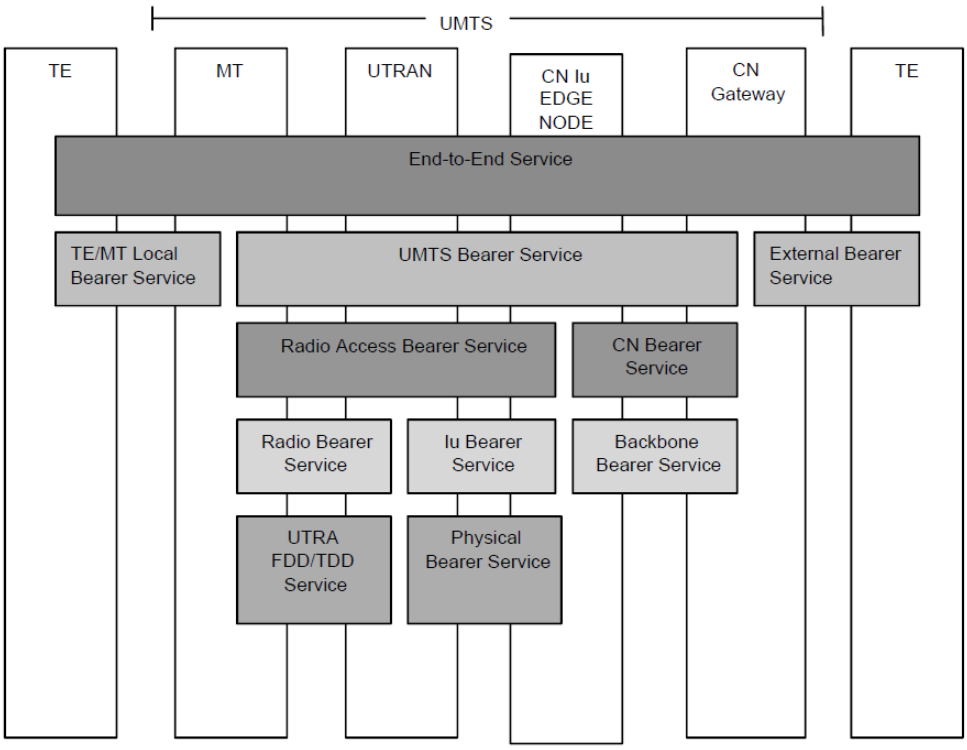



**Figure 1: UMTS QoS Architecture**

### 7. Claim 15: The method as claimed in claim 1, wherein the resources are allocated adaptively.

130. Pedersen and 3GPP23.107 teach that "the resources are allocated adaptively. As explained in [5], Pedersen envisions allocating resources based on the bearer attributes described in 3GPP23.107. According to 3GPP23.107, in a UMTS system like Pedersen's, the "QoS behaviour" of these bearer attributes "should be dynamic," which requires "modify[ing] QoS [bearer] attributes during an active session." *Id.*, 8. Because Pedersen and 3GPP23.107 teach allocating resources based on the bearer attributes described in 3GPP23.107, and 3GPP23.107 directs that these bearer attributes be dynamic, a POSITA implementing Pedersen based on

3GPP23.107, as Pedersen recommends, would have been motivated and found it obvious to allocate the resources "adaptively." *See, e.g.,* Ex. 1011, 164 ("[T]he RB [radio bearer] defines what kind of properties this radio connection has. . . . RBs are also dynamic; they can be reconfigured as necessary."). A POSITA would have had a reasonable expectation of success in implementing Pedersen to allocate resources adaptively, as the UTRAN air interface on which 3GPP's UMTS system is based was designed to permit such adaptive allocation of resources, and bearer reconfiguration was a known technique. *See, e.g.,* Ex. 1011, 177 ("The UTRAN air interface is a very flexible one, allowing for the dynamic allocation of system resources."); *id.*, 178 (describing a "radio bearer reconfiguration procedure, which can change the QoS parameters").

**8. Claims 24, 32, and 34.**

131. These claims all depend from claim 20, which Pedersen teaches. *See* [20]. Pedersen and 3GPP23.107 teach the additional features of these claims. *See* [5], [13], [15].

**9. Claim 26**

132. This claim depends from claim 24, which Pedersen and 3GPP23.107 teach. *See* [24]. Pedersen and 3GPP23.107 teach the additional features of this claim. *See* [7].

### 10. Claim 27

133. This claim depends from claim 22, which Pedersen teaches. *See* [22]. Pedersen and 3GPP23.107 teach the additional features of this claim. *See* [8].

### 11. Claim 30

134. This claim depends from claim 26, which Pedersen and 3GPP23.107 teach. *See* [30]. Pedersen and 3GPP23.107 also teach the additional features of this claim. *See* [11].

### 12. Claim 38

**[38p] A system comprising:**

135. To the extent this preamble is limiting, Pedersen teaches "[a] system." Pedersen describes a UMTS communication system. Pedersen, 1:29–30.

**[38a] the apparatus of claim 20;**

136. Pedersen and 3GPP23.107 render obvious the additional features of this limitation. *See* [20].

**[38b] a plurality of stations, each station associated with at least one subscriber and each subscriber associated with a user subscriber level;**

137. Pedersen envisions "a plurality of stations." Pedersen's UMTS system includes "subscriber terminals" and seeks to support those "terminals' mobility." Pedersen, 1:24–36. Pedersen also teaches that each "subscriber terminal" is "associated with [a] subscriber." In Pedersen, the subscriber, called a "user," is a "a

user of [the] subscriber terminal." Pedersen, 1:15–20. Pedersen also teaches that "each subscriber is associated with a user subscriber level." Pedersen's users each have a "respective subscription profile defining a subscribed quality of service (QoS)," such as "gold, silver, [and] bronze." Pedersen, 5:35–40, 5:58–60.

**[38c] a base station configured to provide bearers to the plurality of stations; and**

138. Pedersen teaches "a base station configured to provide bearers to the plurality of stations." In Pedersen's UMTS system, "the network is hierarchically constructed" and "[c]ommunication with a subscriber terminal . . . is performed by the intermediate of at least one network entity known as Node_B in UMTS (or BS [base station] . . .) handling the communications of the subscriber terminal." Pedersen, 1:41–7. Because each connection between the Node_B and a subscriber terminal is a "bearer," *see* [1b], and the UMTS system includes a plurality of subscriber terminals, *see* [38b], a POSITA would have understood that, in Pedersen's UMTS system, the Node_B is "configured to provide bearers to the plurality of" subscriber terminals.

**[38d] a gateway configured to determine a service provided over the bearers.**

139. Pedersen and 3GPP23.107 teach "a gateway configured to determine a service provided over the bearers." As explained in [13], a POSITA would have been motivated and found it obvious to implement a CN gateway, as described in

3GPP23.107, in Pedersen's UMTS system, and to employ such a gateway to ascertain, or "determine," the traffic class provided over a bearer in order to translate between the UMTS traffic class bearer attribute to a corresponding external bearer service attribute. 3GPP23.107, 9–10; '573 patent, 1:16–18. Because Pedersen's UMTS system includes a plurality of subscriber terminals, [38b], and bearers are provided to the plurality of subscriber terminals, [38c], a POSITA would have recognized that the CN gateway, implemented in Pedersen's UMTS system, would determine the traffic class provided over the bearers.

### C. Ground 3: Pedersen, 3GPP23.107, and 3GPP23.401 Render Obvious Claims 1–8, 10–11, 13–16, 18–27, 29–30, 32–35, and 37–39

140. As explained in Sections VI and IX.B, by 2008 a POSITA seeking to implement Pedersen would have been motivated and found it obvious to implement Pedersen's UMTS system according to the implementation details set forth in the 3GPP technical specifications, and the POSITA would have had a reasonable expectation of success in doing so.

141. A POSITA would have been motivated not only by the 3GPP technical specifications' role as a primary resource for those implementing UMTS networks, but also by Pedersen's recommendation to use a specific 3GPP technical specification, 3GPP23.107, for implementation. This citation to 3GPP23.107 would have led a POSITA directly to the 3GPP technical specifications—technical

specifications the POSITA would have recognized are designed to be used together in the design and implementation of a UMTS network. Ex. 1020, ¶¶35–36 (describing how a POSITA would locate 3GPP technical specifications in any of the series). In light of Pedersen's recommendation of 3GPP23.107, a POSITA would have been motivated in particular to look to other 3GPP technical specifications in the same "23." series relating to "Technical realization" of the UMTS system in implementing Pedersen, and the POSITA could easily have located such 23. series technical specifications, including 3GPP23.401, on the 3GPP website before 2008. Ex. 1020, ¶¶35–36. A POSITA would have found it particularly obvious, and would have had a particular expectation of success, implementing Pedersen's UMTS system according to another 3GPP technical specification in the 23. series, given its known compatibility with 3GPP23.107, which Pedersen specifically recommends for implementation. Pedersen, 5:38–42.

### 1. Claims 1–8, 11, 13–16, 18–27, 30, 32–35, 37–39

142. As discussed in Grounds 1 and 2, Pedersen and 3GPP teach claims 1–8, 11, 13–16, 18–27, 30, 32–35, 37–39. Because the combination of Pedersen and 3GPP23.107 with 3GPP23.401 would retain the aspects of the Pedersen-3GPP23.107 combination relied on in Ground 1, the combination of all three teaches these claims for the same reasons discussed in Grounds 1 and 2, and they are further taught by 3GPP23.401, as explained herein.

**2. Claim 10: The method as claimed in claim 5, wherein at least one service includes an aggregate maximum bit rate (AMBR) and, when the resources have been allocated for all bearers, surplus resources are allocated up to the aggregate maximum bit rate for all bearers over which that service is provided.**

143. Pedersen, 3GPP23.107, and 3GPP23.401 teach that "at least one service includes an aggregate maximum bit rate (AMBR)." As explained in [1a], Pedersen's traffic classes correspond to the claimed services, and 3GPP23.107 explains that a traffic class has associated "bearer level attributes." 3GPP23.107, 13 ("QoS classes, also referred to as traffic classes . . ."). 3GPP23.401 teaches that one such attribute is "Aggregate Maximum Bit Rate (AMBR)." 23.401, 16; '573 patent, 2:47–57 (describing AMBR in Background section). A POSITA implementing Pedersen based on 3GPP23.107 and 23.401 would have been motivated to employ the AMBR attribute, as the AMBR, unlike the GBR and MBR, allows the RNC to control the aggregate amount of data being transferred between elements in the network. Ex. 1024, 1:47–52. Because Pedersen and 3GPP23.107 thus teach that a traffic class has associated "bearer level attributes," and 3GPP23.401 teaches that one bearer level attribute is AMBR, a POSITA would have understood Pedersen, 3GPP23.107, and 3GPP23.401 to teach that "at least one service includes an aggregate maximum bit rate (AMBR)."

144. In implementing Pedersen based on 3GPP23.107 and 23.401, a POSITA would recognize that, "when the resources have been allocated for all

bearers, surplus resources are allocated up to the [AMBR] for all bearers over which" traffic in a particular traffic class is provided. As explained in [5], Pedersen envisions allocating resources based on the bearer attributes described in 3GPP23.107, and one of these bearer attributes is "maximum bit rate." 3GPP23.107, 16. The AMBR attribute, 3GPP23.401 teaches, "denotes a bit rate of traffic per group of bearers" and "limits the aggregate bit rate that can be expected to be provided by the . . . bearers sharing the AMBR." 3GPP23.401, 16. This is because "each" of a number of "bearers could potentially utilize the entire AMBR" associated with the traffic class, but it is also possible that some of these "bearers do not carry any traffic." 3GPP23.401, 16. From this, a POSITA would have understood that when there are "surplus resources," *e.g.*, when some bearers do not carry any traffic, these surplus resources would be "allocated up to the aggregate maximum bit rate for all bearers over which that service is provided," in accordance with the bearers' shared AMBR.'573 patent, 2:47–57 (explaining in Background that "multiple . . . bearers of the same connection can share the same AMBR," each "could potentially use the entire AMBR, *e.g.*, when the other . . . bearers do not carry any traffic.").

**3. Claim 29**

145. This claim depends from claim 24, which Pedersen and 3GPP23.107 teach. *See* [24]. Pedersen, 3GPP23.107, and 3GPP23.401 teach the additional features of this claim. *See* [10].

### D. Ground 4: Pedersen, 3GPP23.107, and 3GPP23.203 Render Obvious Claims 1–8, 11, 13–27, 30, and 32–39

146. As explained in Sections VI, IX.B, and IX.C, by 2008 a POSITA seeking to implement Pedersen would have been motivated and found it obvious to implement Pedersen's UMTS system according to the implementation details set forth in the 3GPP technical specifications and the POSITA would have had a reasonable expectation of success in doing so. A POSITA would have found it particularly obvious, and would have had a particular expectation of success, implementing Pedersen's UMTS system according to another 3GPP technical specification in the 23. series, given its known compatibility with 3GPP23.107, which Pedersen specifically recommends for implementation. Pedersen, 5:38–42.

#### 1. Claims 1–8, 11, 13–16, 18–27, 30, 32–35, 37–39

147. As discussed in Grounds 1 and 2, Pedersen and 3GPP teach claims 1–8, 11, 13–16, 18–27, 30, 32–35, 37–39. Because the combination of Pedersen and 3GPP23.107 with 3GPP23.401 would retain the aspects of the Pedersen-3GPP23.107 combination relied on in Ground 2, the combination of all three teaches these claims for the same reasons discussed in Grounds 1 and 2, and they are further taught by 3GPP23.203, as explained herein.

### 2. Claim 13: The method as claimed in claim 1, wherein the service provided over the bearer is ascertained by a gateway of the communications system.

148. As explained for [13] in Ground 2, a POSITA implementing Pedersen based on 3GPP23.107, as Pedersen recommends, would have been motivated and found it obvious to employ a CN gateway that, in order to translate between the UMTS traffic class bearer attribute and a corresponding external bearer service attribute, as 3GPP23.107 teaches, "ascertain[s]" the traffic class. One such attribute in need of translation is the "QoS Class Identifier (QCI) parameter," which has a 1:1 mapping to a set of QoS parameters defined" in accordance with "3GPP23.107." 3GPP23.203, 49. *See* [17]. For example, it would be obvious to a POSITA that, for an uplink bearer, the CN gateway would translate the external bearer service attributes into the corresponding UMTS bearer attributes, including, for example, a QoS Class Identifier ("QCI) indicating, among others, the UMTS traffic class bearer attribute, 3GPP23.203, 49. *See* [17]. A POSITA would have had a reasonable expectation of success in implementing the CN gateway this way, as implementation of a UMTS network including a CN gateway was within the skill of a POSITA and is prescribed by the 3GPP technical specifications.

### 3. Claim 17: The method as claimed in claim 1, wherein the service is defined by a quality control indication (QCI) of the bearer.

149. Pedersen, 3GPP23.107, and 3GPP23.203 teach that the "service is

defined by a quality control indication (QCI)." As explained in [1a], Pedersen's traffic classes correspond to the claimed services, and 3GPP23.107 explains that a traffic class has associated "bearer level attributes." 3GPP23.107, 13 ("QoS classes, also referred to as traffic classes . . ."). 3GPP23.203 teaches that QCI is used to indicate the traffic class's bearer level attributes. 3GPP23.203, 49.

150. As 3GPP23.203 teaches, the "QoS Class Identifier (QCI) parameter has a 1:1 mapping to a set of QoS parameters defined" in accordance with "3GPP23.107." 3GPP23.203, 49. As shown in the table below, for example, the "conversational," "streaming," "interactive," and "background" traffic classes have associated QCI values. *Id.* From this, a POSITA would have understood that a traffic class "is defined by a quality control indication (QCI) of the bearer."

151. While claims 17 and 36 say "quality control indication (QCI)," a POSITA would recognize that this is the same thing as "QoS Class Identifier (QCI)," which is also used in the '573 patent and throughout 3GPP technical specifications, including in 3GPP23.203. '573 patent, 2:11. *See, e.g.*, Ex. 1017 (defining "QCI" as "QoS Class Identifier"); Ex. 1024 (defining "QCI" alternatively as "QoS Class Identifier" and "quality control indicator"); Ex. 1025 (same).

**Table A.3: Recommended mapping for QoS Class Identifier to/from QoS parameters**

| GPRS QoS Class Identifier value | UMTS QoS parameters | | | |
|---|---|---|---|---|
| | Traffic Class | THP | Signalling Indication | Source Statistics Descriptor |
| a | Conversational | n/a | n/a | speech (NOTE) |
| b | Conversational | n/a | n/a | unknown |
| c | Streaming | n/a | n/a | speech (NOTE) |
| d | Streaming | n/a | n/a | unknown |
| e | Interactive | 1 | Yes | n/a |
| f | Interactive | 1 | No | n/a |
| g | Interactive | 2 | No | n/a |
| h | Interactive | 3 | No | n/a |
| i | Background | n/a | n/a | n/a |
| NOTE: The operator's configuration should reserve QCI values that map to "speech" for service data flows consisting of speech (and the associated RTCP) only. | | | | |

152. Because 3GPP23.203 thus teaches using a QoS Class Identifier parameter to indicate the QoS parameters of a traffic class, a POSITA implementing Pedersen according to the 3GPP23.107 and 23.203 would have been motivated and found it obvious to define the traffic class using a QCI, which provides a simplified indication of the multiple QoS parameters defined in 3GPP23.107. A POSITA would have had a reasonable expectation of success in doing so, as the QCI "has a 1:1 mapping to a set of QoS parameters defined" in accordance with "3GPP 23.107," making use of the QCI to indicate the QoS parameters straightforward and within the skill of a POSITA. *Id.* Thus Pedersen, 3GPP23.107, and 3GPP23.203 teach that the "service is defined by a quality control indication (QCI)."

#### 4. Claim 32

153. This claim depends from claim 20, which Pedersen teaches. *See* [20]. Pedersen, 3GPP23.107, and 3GPP23.203 teach the additional features of this claim. *See* [13].

#### 5. Claim 36

154. This claim depends from claim 20, which Pedersen teaches. *See* [20]. Pedersen, 3GPP23.107, and 3GPP23.203 teach the additional features of this claim. *See* [17].

### E. Ground 5: Pedersen, 3GPP23.107, and 3GPP36.300 Render Obvious Claims 1–9, 11–16, 18–28, 30–35, and 37–39

155. As explained in Sections VI, IX.B, and IX.C, by 2008 a POSITA seeking to implement Pedersen would have been motivated and found it obvious to implement Pedersen's UMTS system according to the implementation details set forth in the 3GPP technical specifications, and the POSITA would have had a reasonable expectation of success in doing so.

156. Before 2008, a POSITA would also have known that by 2007 3GPP began to develop technical specifications prescribing implementation details for an "Evolved" UTRAN, called E-UTRAN as well, including 3GPP36.300. 3GPP36.300, 1. The '573 patent itself acknowledges that the E-UTRAN network was known. '573 patent, 1:60–66. A POSITA would have been motivated and found it

obvious to consider, in addition to the 23. series technical specifications like 3GPP23.107, the 36. series technical specifications from 3GPP in implementing Pedersen's UMTS system. A POSITA would have been motivated not only by the 3GPP technical specifications' role as a primary resource for those implementing UMTS networks, but also by Pedersen's citation to 3GPP23.107, which would have led a POSITA directly to the 3GPP technical specifications—technical specifications the POSITA would have recognized are designed to be used together in the design and implementation of a telecommunications network. Ex. 1020, ¶¶35–36. Thus, a POSITA would have been motivated in particular to look to other 3GPP technical specifications in implementing Pedersen, and the POSITA could easily have located, in addition to the 23. series technical specifications, those in the 36. series, including 3GPP36.300, on the 3GPP website before 2008. Ex. 1020, ¶¶35–36.

157. A POSITA would have found it obvious to implement Pedersen's UMTS system according to the implementation details set forth in the 3GPP technical specifications, and a POSITA would have had a reasonable expectation of success in doing so, because this was the very purpose of the 3GPP technical specifications, and POSITAs commonly referenced the 3GPP technical specifications in the design and implementation of UMTS systems. Ex. 1020, ¶33.

### 1. Claims 1–8, 11, 13–16, 18–27, 30, 32–35, 37–39

158. As discussed in Grounds 1 and 2, Pedersen and 3GPP teach claims 1–8, 11, 13–16, 18–27, 30, 32–35, 37–39. Because the combination of Pedersen and 3GPP23.107 with 3GPP36.300 would retain the aspects of the Pedersen-3GPP23.107 combination relied on in Ground 2, the combination of all three teaches these claims for the same reasons discussed in Grounds 1 and 2, and they are further taught by 3GPP36.300, as explained herein.

### 2. Claim 9: The method as claimed in claim 5, wherein at least one service includes a prioritised bit rate (PBR) and, in the step of allocating resources, the resources are allocated to provide the prioritised bit rate for the bearer over which that service is provided.

159. Pedersen, 3GPP23.107, and 3GPP36.300 teach that "at least one service includes a prioritised bit rate (PBR)." As explained in [1a], Pedersen's traffic classes correspond to the claimed services.

160. 3GPP36.300 describes "an overview and overall description of the E-UTRAN radio interface protocol architecture." 3GPP36.300, 9. Just as in a UMTS system, as described in Pedersen and 3GPP23.107, the E-UTRAN system uses attributes like guaranteed minimum bit rate (GBR), maximum bit rate (MBR), and aggregate maximum bit rate (AMBR) to "manage[] . . . resources between bearers." 3GPP36.300, 52; *see* [5], [7], [8], [10]. The E-UTRAN system additionally manages resources according to a new attribute, "prioritised bit rate (PBR)." 3GPP36.300, 52.

As 3GPP36.300 explains, "[a]ll the radio bearer(s)" are served "in decreasing priority order up to their PBR[.]" Remaining resources are then allocated to the bearers, again "in decreasing priority," while "ensur[ing] that the MBR and AMBR are not exceeded." *Id.*

161. While Pedersen uses a UMTS system for explanation, Pedersen makes clear that the described handover method is not "limited to a specific communication network type." Pedersen, 1:21–24. Thus, by the time of the '573 patent, when the E-UTRAN system had already improved on the UTRAN in the UMTS system, a POSITA would have been motivated and found it obvious to implement Pedersen's handover method in connection with the PBR of the E-UTRAN system. A POSITA would have been motivated by the additional capabilities provided by the PBR attribute, for example, that it "maximises the transmission of higher priority data." 3GPP36.300, 52. A POSITA would have found such an implementation obvious, and would have had a reasonable expectation of success in such an implementation, as Pedersen's UTMS system was, as 3GPP23.107 explains, already equipped to allocate resources according to similar attributes, like GBR, MBR, and AMBR, and a POSITA would have found it straightforward to allocate resources according to a single additional attribute.

162. Because Pedersen and 3GPP23.107 thus teach that a traffic class has associated "attributes," and 3GPP36.300 teaches that, in an improved E-UTRAN

system these attributes may include, in addition to GBR, MBR, and AMBR, a "prioritised bit rate (PBR)," a POSITA would have understood Pedersen, 3GPP23.107, and 3GPP36.300 to teach that "at least one service includes a prioritised bit rate (PBR)." Further, because 3GPP36.300 teaches managing resources between traffic classes in accordance with their PBRs, a POSITA would have understood Pedersen, 3GPP23.107, and 3GPP36.300 to teach that, "in the step of allocating resources, the resources are allocated to provide the prioritised bit rate for the bearer over which that service is provided."

### 3. Claim 12: The method as claimed in claim 9 wherein the PBR is for the bearer in one of the uplink direction, the downlink direction, or both the uplink and the downlink directions.

163. Pedersen, 3GPP23.107, and 3GPP36.300 teach that "the PBR is for the bearer in . . . the uplink direction." As explained in [9], Pedersen, 3GPP23.107, and 3GPP36.300 teach allocating resources based on the PBR. Because 3GPP36.300 uses PBR as part of the "uplink rate control function," 3GPP36.300, 52, a POSITA would have understood that the PBR "is for the bearer in . . . the uplink direction." From this, a POSITA implementing Pedersen based on 3GPP23.107 and 36.300 would have been motivated and found it obvious to employ the PBR for each bearer in the uplink direction. A POSITA would have had a reasonable expectation of success in doing so, as the UMTS system prescribed by 3GPP36.300 is designed to support uplink PBR, and employing the PBR this way would have been within the

skill of a POSITA. *Id.*

**4. Claim 28**

164. This claim depends from claim 24, which Pedersen and 3GPP23.107 teach. *See* [24]. Pedersen, 3GPP23.107, and 3GPP36.300 teach the additional features of this claim. *See* [9].

**5. Claim 31**

165. This claim depends from claim 28, which Pedersen, 3GPP23.107, and 3GPP23.300 teach. See [84]. Pedersen, 3GPP23.107, and 3GPP36.300 also teach the additional features of this claim. See [12].

## X. Additional Remarks

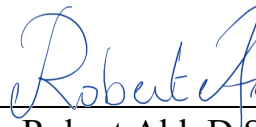
166. I currently hold the opinions expressed in this declaration. But my analysis may continue, and I may acquire additional information and/or attain supplemental insights that may result in added observations.

167. I have reviewed the accompanying Petition for *Inter Partes* Review of the '573 Patent and, given the information set forth in this declaration, I agree with the reasoning and conclusions of the grounds of challenge in the petition. Based on my own analysis, I agree that Pedersen, alone and/or in combination with the 3GPP specifications, teaches all of the limitations of and renders unpatentable claims 1-39.

* * *

I hereby declare that all statements made are of my own knowledge are true and that all statements made on information and belief are believed to be true. I further declare that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of the Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this proceeding.

Dated: March 1, 2022

By: 

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