IN THE

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HTC CORPORATION and HTC AMERICA, INC.,

Petitioners,

- vs. -

CELLULAR COMMUNICATIONS EQUIPMENT LLC,

Patent Owner.

Patent No. 8,457,676
Issue Date: June 4, 2013
Title: Power Headroom Reporting Method

Inter Partes Review No. ____

DECLARATION OF TIM A. WILLIAMS, PH.D. IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT 8,457,676 UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R §§ 42.100

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I. INTRODUCTION

1. My name is Tim A. Williams, Ph.D. I have been asked by HTC Corporation and HTC America, Inc. to provide my expert opinions in support of their petition for *inter partes* review of Patent No. 8,457,676 ("the '676 Patent"), challenging the validity of claims 1-14 of the '676 Patent.

2. I currently hold the opinions set forth in this declaration.

3. In summary, it is my opinion that the references cited below render obvious the claims of the '676 patent. My detailed opinions on the claims are set forth below.

B. Background and Qualifications

4. I earned a Bachelor's Degree in Electrical Engineering from Michigan Technological University in 1976. I obtained my Master's Degree and Ph.D. in Electrical Engineering from the University of Texas at Austin in 1982 and 1985, respectively. I obtained a Masters of Business Administration from the University of Texas at Austin in 1991.

5. My professional industry experience includes approximately 15 years at Motorola Inc., where I was a Senior Engineer and Senior Member of the Technical Staff working on the development of communications systems technologies including the cellular architectures that included Global Systems

Mobile (GSM) voice codecs and channel modem, as well as Code Division Multiplexing (CDMA) voice codecs and channel modems to name a few.

6. I was the co-founder, CTO, Vice President of Engineering and Business Strategy CEO of Wireless Access, which developed PCS equipment for 2-way paging services. Wireless Access was sold to Glenarye Electronics. I served as the CTO and Advisory Board Member of Picazo Communications. I was also an Interim CEO and Advisory Board Member of Atheros Communications which was acquired by Qualcomm Inc., in 2011. I was the founder and CEO of JetQue Inc., which developed messaging solutions for mobile environments. I was the founder and CEO of SiBEAM Inc., which developed high speed networking ICs. SiBEAM was sold to Silicon Image in 2011. I have held numerous other technical and leadership positions in industry that are detailed in my CV that is attached hereto.

7. I am a registered Patent Agent (USPTO Reg. No. 50,790). I am an inventor and co-inventor on 26 issued patents which are listed in my CV.

8. I have served as an expert witness in over 75 patent litigation cases including cases in the Federal District Courts and the International Trade Commission.

9. A copy of my complete CV is attached hereto as Exhibit A.

C. List of Cases Serving as Testifying Expert in Last Four Years

10. In the past four years, I have provided technical consulting and expert testimony on behalf of clients as shown in my attached CV and list of cases in Exhibit A.

D. Compensation

11. I am being compensated for my time at the rate of $675 per hour. This compensation is not contingent upon my performance, the outcome of this matter, or any issues involved in or related to this matter.

E. Documents and Other Materials Relied Upon

12. In forming the opinions set forth in this declaration, I have reviewed the ’676 patent, its prosecution history, and the prior art references described below. Additionally, I have considered my own experience and expertise of the knowledge of the person of ordinary skill in the relevant art in the timeframe of the claimed priority date of the ’676 patent. In doing so, I have reviewed information generally available to, and relied upon, by a person of ordinary skill at the time of the invention.

13. I anticipate using some of the above-referenced documents and information, or other information and material that may be made available during the course of this proceeding (such as by deposition testimony), as well as representative charts, graphs, schematics, and diagrams, animations, and models

that will be based on those documents, information, and material, to support and to explain my testimony before the PTAB regarding the invalidity of the ’676 Patent.

II. LEGAL PRINCIPLES

A. Claim Interpretation

14. While I am a registered Patent Agent, I am not a Patent Attorney and I do not opine in this paper on any particular methodology for interpreting patent claims. My opinions are limited to what I believe a person of ordinary skill in the art would have understood the meaning of certain claim terms to be based on the intrinsic evidence of the ’676 patent. I use the principles below, however, as a guide in formulating my opinions.

15. I am informed and understand that it is a basic principle of patent law that assessing the validity of a patent claim involves a two-step analysis. In the first step, the claim language must be properly construed to determine its scope and meaning. In the second step, the claim as properly construed must be compared to the alleged prior art to determine whether the claim is valid.

16. I am informed and understand that the words of a patent claim have their plain and ordinary meaning for a person skilled in the art at the time of the invention. This meaning must be ascertained from a reading of the patent documents, paying special attention to the language of the claims, the written specifications, and the prosecution history. I understand that an inventor may

attribute special meanings to some terms by defining those terms or by otherwise incorporating such meanings in these documents.

17. My methodology for determining the meaning of claim phrases was first to carefully study the ’676 patent. In particular, I studied the claims themselves, followed by a study of the background, detailed specification, figures, and other patent content. Next, I reviewed the file history looking for any clarifications or limitations that might be attached to claim terms. In some circumstances, I looked at other documents, such as references applied by the Patent Office.

B. Prior Art

18. It is my understanding that only information which satisfies one of the categories of prior art set forth in 35 U.S.C. § 102 may be used in any invalidity analysis under §§ 102 or 103. Therefore, if information is not properly classified as prior art under one of the subsections of § 102, then it may not be considered in an anticipation or obviousness determination. It is also my understanding that, for *inter partes* review, applicable prior art is limited to patents and printed publications.

19. I am informed and understand that the earliest claimed priority date for the ’676 patent is June 20, 2007. I also understand that prior art references published on or before June 20, 2007 are always considered prior art to the ’676

patent, and that prior art references published after June 20, 2007 but before June 23, 2008 are considered prior art to the ’676 patent unless the patent owner can prove that the purported invention was conceived before the publication of the reference. I understand that a patent granted on an application for patent, filed in the United States before June 20, 2007, is considered prior art to the ’676 patent unless the patent owner can prove that the purported invention was conceived before the filing date of the prior art reference or that the prior art reference and the ’676 patent shared common inventors, were co-owned, or under an obligation of assignment to a common owner at the time the application was filed.

C. Anticipation

20. I am informed and understand that to anticipate a patent claim under 35 U.S.C. § 102, a single asserted prior art reference must disclose each and every element of the claimed invention, either explicitly or inherently, to a person of ordinary skill in the art. I understand that a disclosure of an asserted prior art reference can be “inherent” if the missing element must necessarily be present in what is explicitly described in the asserted prior art reference and such would be recognized by a person of ordinary skill in the art. However, I understand that inherency cannot be established by mere probabilities or possibilities.

D. Obviousness

21. I am also informed and understand that a patent claim is invalid under 35 U.S.C. § 103 if the differences between the invention and the prior art are such that the subject matter as a whole would have been obvious at the time of the invention to a person having ordinary skill in the art to which the subject matter pertains. Obviousness, as I understand, is based on the scope and content of the prior art, the differences between the prior art and the claim, the level of ordinary skill in the art, and secondary indications of non-obviousness to the extent they exist.

22. I understand that whether there are any relevant differences between the prior art and the claimed invention is to be analyzed from the view of a person of ordinary skill in the art at the time of the invention. A person of ordinary skill in the art is a hypothetical person who is presumed to be aware of all of the relevant art at the time of the invention. The person of ordinary skill is not an automaton, and may be able to fit together the teachings of multiple patents employing ordinary creativity and the common sense that familiar items may have obvious uses in another context or beyond their primary purposes.

23. In analyzing the relevance of the differences between the claimed invention and the prior art, I understand that I must consider the impact, if any, of such differences on the obviousness or non-obviousness of the invention as a whole, not merely some portion of it. The person of ordinary skill faced with a

problem is able to apply his or her experience and ability to solve the problem and also look to any available prior art to help solve the problem.

24. An invention is obvious if a designer of ordinary skill in the art, facing the wide range of needs created by developments in the field, would have seen an obvious benefit to the solutions tried by the applicant. When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, it would be obvious to a person of ordinary skill to try the known options. If a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique would have been obvious.

25. I understand that I do not need to look for precise teaching in the prior art directed to the subject matter of the claimed invention. I understand that I may take into account the inferences and creative steps that a person of ordinary skill in the art would have employed in reviewing the prior art at the time of the invention. For example, if the claimed invention combined elements known in the prior art and the combination yielded results that were predictable to a person of ordinary skill in the art at the time of the invention, then this evidence would make it more likely that the claim was obvious. On the other hand, if the combination of known elements yielded unexpected or unpredictable results, or if the prior art teaches

away from combining the known elements, then this evidence would make it more likely that the claim that successfully combined those elements was not obvious.

26. In determining whether a claimed invention is invalid for obviousness, one should consider the scope and content of the prior art, the level of ordinary skill in the relevant art, the differences between the claimed invention and the prior art, and whether the claimed invention would have been obvious to a person having ordinary skill in the art in light of those differences. I understand that hindsight must not be used when comparing the prior art to the invention for obviousness.

1. Motivation to Combine

27. I understand that a claimed invention may be obvious if some teaching, suggestion or motivation exists that would have led a person of ordinary skill in the art to combine the invalidating references. I also understand that this suggestion or motivation may come from sources such as explicit statements in the prior art, or from the knowledge of a person having ordinary skill in the art. Alternatively, any need or problem known in the field at the time and addressed by the patent may provide a reason for combining elements of the prior art. I also understand that when there is a design need or market pressure, and there are a finite number of predictable solutions, a person of ordinary skill may be motivated

to apply both his skill and common sense in trying to combine the known options in order to solve the problem.

28. Obviousness may also be shown by demonstrating that it would have been obvious to modify what is taught in a single piece of prior art to create the patented invention. Obviousness may be shown by showing that it would have been obvious to combine the teachings of more than one item of prior art. In determining whether a piece of prior art could have been combined with other prior art or with other information within the knowledge of a person having ordinary skill in the art, the following are examples of approaches and rationales that may be considered:

- Combining prior art elements according to known methods to yield predictable results;
- Simple substitution of one known element for another to obtain predictable results;
- Use of a known technique to improve similar devices (methods, or products) in the same way;
- Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;

- Applying a technique or approach that would have been "obvious to try" (choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success);
- Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to a person having ordinary skill in the art; or
- Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

2. Secondary Considerations

29. I understand that certain objective factors, sometimes known as "secondary considerations," may also be taken into account in determining whether a claimed invention would have been obvious. In most instances, these secondary considerations of non-obviousness are raised by the patentee. In that context, the patentee argues an invention would not have been obvious in view of these considerations, which include: (a) commercial success of a product due to the merits of the claimed invention; (b) a long-felt, but unsatisfied need for the invention; (c) failure of others to find the solution provided by the claimed

invention; (d) deliberate copying of the invention by others; (e) unexpected results achieved by the invention; (f) praise of the invention by others skilled in the art; (g) lack of independent simultaneous invention within a comparatively short space of time; (h) teaching away from the invention in the prior art. I also understand that these objective indications are only relevant to obviousness if there is a connection, or nexus, between them and the invention covered by the patent claims.

30. I also understand that secondary considerations of non-obviousness are inadequate to overcome a strong showing on the primary considerations of obviousness. For example, where the inventions represented no more than the predictable use of prior art elements according to their established functions, the secondary considerations are inadequate to establish non-obviousness.

31. I am not aware of any objective indicia of non-obviousness for the ’676 patent.

E. Date of Invention

32. I understand that absent clear and convincing evidence of invention date prior to the filing date of a patent, the invention date of the patent is presumed to be its effective filing date. A prior invention requires a complete conception of the invention and a reduction to practice of that invention. The patentee has the burden of establishing by clear and convincing evidence a date of conception earlier than the effective filing date of the patent.

33. Conception is the formation in the mind of the inventor of a definite and permanent idea of the complete and operative invention. Conception must be proved by corroborating evidence which shows that the inventor disclosed to others his complete thought expressed in such clear terms as to enable those skilled in the art to make the claimed invention. The inventor must also show possession of every feature recited in the claims, and that every limitation was known to the inventor at the time of the alleged conception. Furthermore, the patentee must show that he or she has exercised reasonable diligence in later reducing the invention to practice, either actual or constructive. The filing of a patent application can serve as a constructive reduction to practice.

III. THE ’676 PATENT

A. The ’676 Patent Technology Background and Disclosure

34. The ’676 patent generally relates to wireless communication technologies and the reporting of power headroom information from a mobile unit to a base station. There are two general types of power control used in mobile communications: open-loop (OLPC) and closed-loop (CLPC). ’676 patent at 3:1-14. The ’676 patent discusses a trend at that time to use uplink power control techniques that included an OLPC mechanism at the mobile unit and an ability for the base station to send CLPC correction commands to the mobile unit. *Id.* at 3:15-22. The ’676 patent purports to claim both methods and apparatuses for the

reporting of power headroom information from user equipment based on triggering criterion. *See id.* at claims 1, 19. The ’676 patent also purports to claim network equipment, such as a base station, which receives a power headroom report from user equipment that was generated based on triggering criterion and provides an adjustment signal to the user equipment. *See id.* at claim 33.

35. Claim 1 is representative of the user equipment claims and is reproduced below:

> 1. A method comprising:
>
> determining that a set of at east [sic] one triggering criterion is met; and
>
> providing a power control headroom report on an uplink from user equipment, in response to determining that the set is met, wherein said at least one triggering criterion include at least one threshold having been reached, wherein said at least one threshold is adjustable via a signal to the user equipment, wherein the set of at least one triggering criterion comprises a criterion being met based on reaching a threshold of the at least one threshold of k transmission time intervals following a previous power control headroom report, wherein k is an integer and wherein said at least one threshold adjustable via the signal comprises adjusting the threshold integer k.

Id. claim 1 at 6:26-40. Claim 33 is representative of the network element claims and is reproduced below:

> 33. A network element comprising:
>
> at least one processor; and
>
> at least one memory including software, where the at least one memory and the software are configured, with the at least one processor, to cause the network element to at least:
>
> receive a power control headroom report on an uplink from user equipment, in response to the user equipment determining that a set of at least one triggering criterion is met because at least one threshold has been reached, wherein the set of at least one triggering criterion comprises a criterion being met based on reaching a threshold of the at least one threshold of k transmission time intervals following a previous power control headroom report, wherein k is an integer and wherein said at least one threshold adjustable via the signal comprises adjusting the threshold integer k; and
>
> provide a threshold adjustment signal to the user equipment in order to adjust the at least one threshold.

Id. claim 33 at 9:12-10:9.

36. In the specification of the ’676 patent, the applicant described the invention as generally related to the “field of wireless telecommunications.” Exhibit 1001 at 1:11-13. The applicant further described improvements to the UMTS standard being developed by the 3GPP art related to the invention. See Exhibit 1001, ‘676 patent at 1:27-36. Thus, the applicant has admitted that descriptions of the UMTS system and improvements to the UMTS system being worked on by the 3GPP are analogous art to the invention of the ’676 patent. One skilled in the art would also appreciate that based on the technology claimed in the ’676 patent.

B. Challenged Claims of the ’676 Patent

37. I understand that the challenged claims of the ’676 patent are claims 1, 3, 19, 21, 33, and 34 Challenged claims 1, 19, and 33 are independent claims. Challenged claims 3, 21, and 34 are dependent claims.

C. Person of Ordinary Skill in the Art for the ’676 Patent

38. I expect to offer testimony regarding the level of ordinary skill in the art relevant to the ’676 patent.

39. I understand that factors such as the education level of those working in the field, the sophistication of the technology, the types of problems encountered in the art, the prior art solutions to those problems, and the speed at which innovations are made may help establish the level of skill in the art.

40. The ’676 patent relates to methods and apparatus for wireless communications. The claimed priority date for the ’676 patent is June 27, 2007.

41. In the 2007 time frame, I believe that a person of ordinary skill in the art of the subject matter of the ’676 patent would have had a Bachelor’s degree in electrical engineering or a similar degree, with 2-4 years of experience in the design and implementation of such wireless communication systems, or the equivalent.

42. Based on my education and experience in the field of wireless communications relevant to the ’676 patent, I would have been at least a person of ordinary skill in the art at the earliest priority date of the ’676 patent. Unless otherwise stated below, when I provide my understanding and analysis below, it is consistent with the level of ordinary skill in the technologies at or around the priority date of the ’676 patent.

D. Claim Construction

43. I understand that for the purpose of *inter partes* review, claim terms are presumed to take on their broadest reasonable interpretation (BRI), to a person of ordinary skill in the art, which is consistent with the specification. It is my opinion that this presumption is appropriate for the interpretation of the challenged claims of the ’676 Patent.

44. My opinions regarding the construction of certain claim terms are limited only to this *inter partes* review, under the standard articulated above, and should not be interpreted as my opinion regarding the construction of those certain claim terms under the standard of claim construction used in a district court (or any other) proceeding.

1. "power control headroom report"

45. A "power control headroom report" appears in claims 1, 19, and 33, as well as other challenged claims that depend from those claims. The broadest reasonable interpretation of that term refers to a report that provides a measure of how close the terminal's transmission power is relative to its maximum transmission power. Ex. 1001 at 3:31-37; *see also id.* 3:46-65. Indeed, power control headroom is generally understood by those of ordinary skill in the art to refer to any report regarding the transmission power conditions that may be relevant to determining power control instructions.

2. "transmission time interval"

46. A "transmission time interval" appears in claims 1, 19, and 33, as well as other challenged claims that depend from those claims. The broadest reasonable interpretation of that term refers to any specified period of time. Ex. 1001 at 2:27-29, 4:39-43. That interpretation is demonstrated by the claim language itself, which indicates that a transmission time interval is a period of time (an "interval") that

can be measured. That definition is further demonstrated by the specification, which refers to the transmission time interval as “a period of time.” Ex. 1001 at 2:27-29; *see also id.* at 4:39-43. Those skilled in the art would have understood that transmission time intervals typically refers to a specified period of time, such as 20 microseconds, that is set for a communication system.

3. “path loss”

47. The term “path loss” appears in challenged claims 3, 21, and 34. The broadest reasonable interpretation of that term refers to any wireless signal loss. Ex. 1001 at 4:2-12. There is not much description of path loss in the ’676 patent, but those skilled in the art would have understood that term to mean degradation or loss in the quality of a wireless signal, such as through distance, shadowing, or other factors known well by those skilled in the art.

48. I reserve the right to amend my opinions stated herein should the Board order a construction of claim terms other than my opinion reflected herein regarding their broadest reasonable interpretation to a person of ordinary skill in the art at the time of the ’676 patent application.

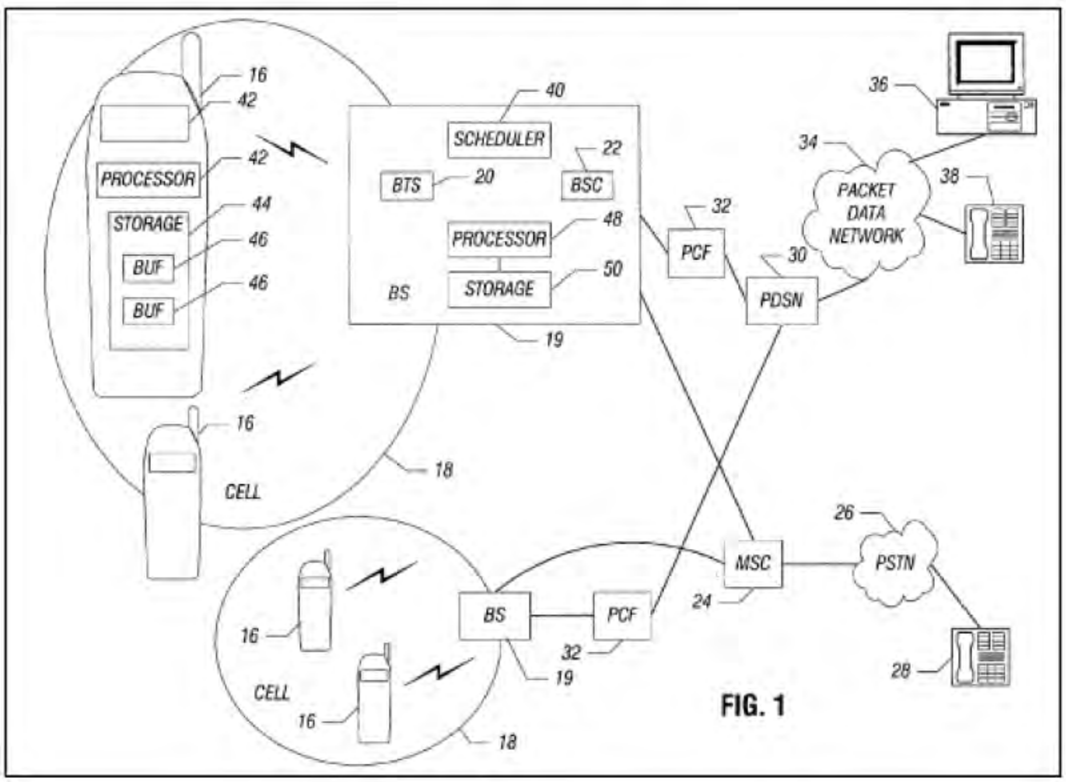
IV. PRIOR ART

A. U.S. Pat. App. Pub. No. 2004/0223455 (Fong) (Ex. 1004)

49. The Fong publication, titled “Communicating in a Reverse Wireless Link Information Relating to Buffer Status and Data Rate of a Mobile Station,” was filed on March 12, 2004 and published on November 11, 2004. As such, it is

my understanding that Fong qualifies as prior art to the '676 patent under 35 U.S.C. § 102(b). Fong was not considered by the examiner during prosecution of the '676 patent.

50. Fong discloses a wireless communication network, including a mobile station and a base station that communicate information over a wireless link. Ex. 1004 at Abstract. Fong teaches communicating information relating to the maximum supportable data rate of the mobile station and the status of buffer(s) in the mobile station by using a reverse request message sent in the reverse wireless link from the mobile station to the base station. *E.g., id.* at [0010, 0028]. Fong's disclosed network is illustrated in Figure 1, which includes base stations 19 ("BS") in wireless communication with mobile stations 16.



Id. at Fig. 1, [0030].

51. As shown in Figure 1, each mobile station 16 includes a processor 42 and storage 44, on which one or more software modules are executable to enable the mobile station to perform various tasks. *Id.* at [0031]. Similarly, each base station 19 includes at least a processor 48 and storage 50, and the base station's scheduler 40 can be a software module that is executable on processor 48. *Id.*

52. Fong's Figure 2 is a message flow diagram illustrating the communication of reverse request messages containing buffer status and data rate information over a reverse wireless link.

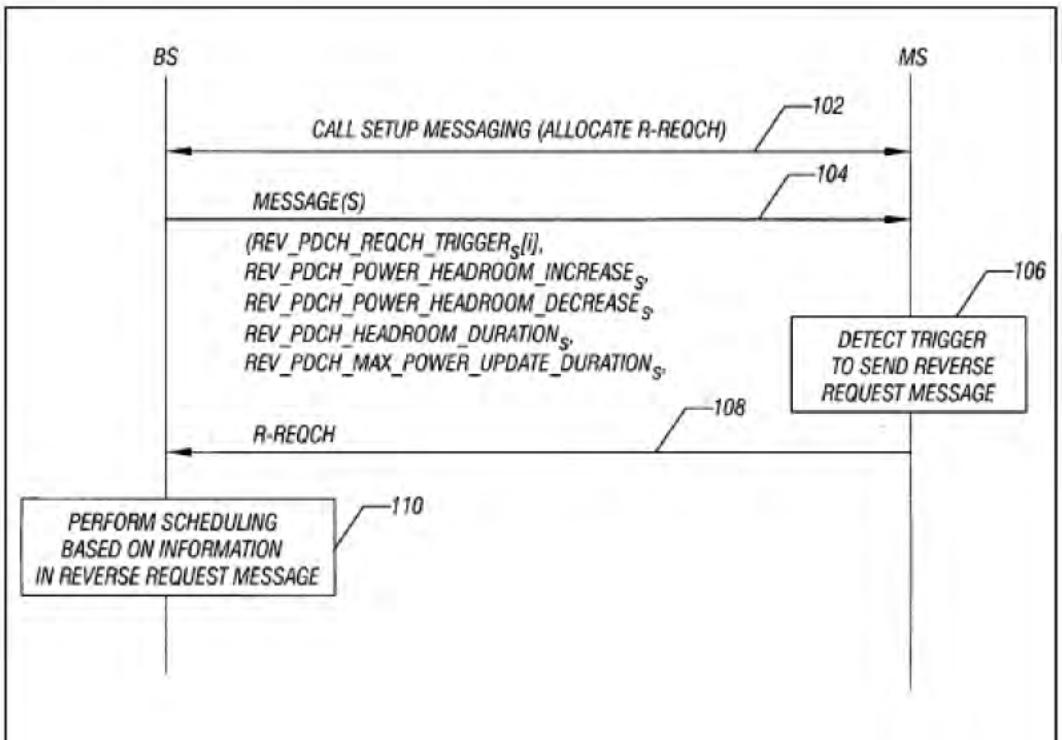


FIG. 2

Id. at Fig. 2, [0043].

53. Initially, call setup messaging is exchanged between the base station 19 and the mobile station 16, which can allocate a reverse request channel (R-REQCH) to the mobile station. *Id.* At 104, the base station sends various messages to the mobile station, with such message(s) containing trigger parameters that are used by the mobile station to trigger the transmission of a reverse request message on R-REQCH. *Id.* These trigger parameters can be sent by the base station to the mobile station at any time during the active state of the mobile station. *Id.* Examples of trigger parameters that are sent by the base station to the mobile station are illustrated in Figure 2 and described in detail, see *e.g., id.* at Fig. 2, [0044-0048], but Fong notes that other trigger parameters can be used, *id.* at [0049].

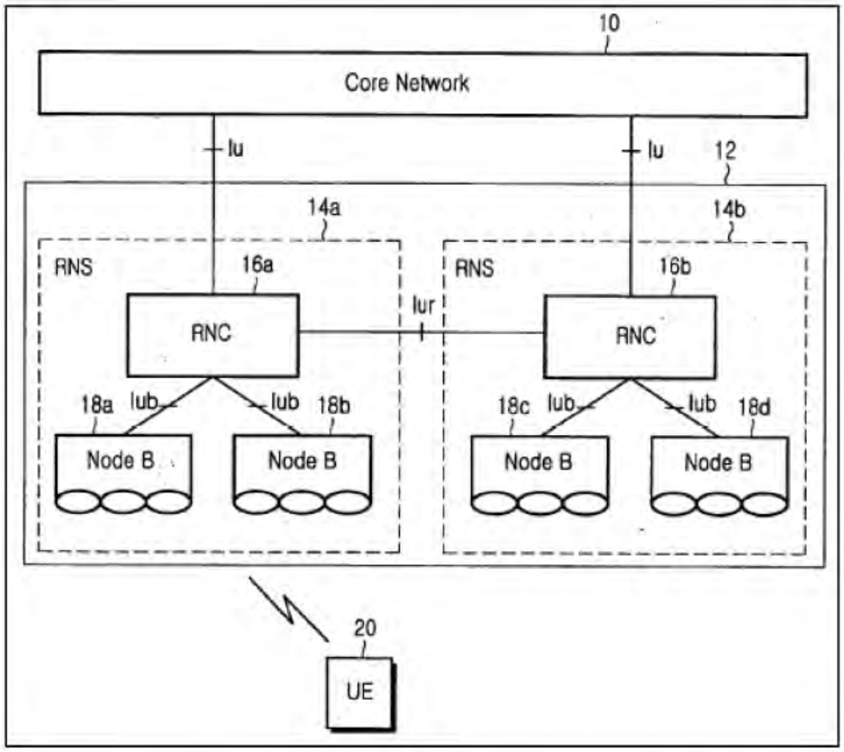
54. Next, at 106, the mobile station detects whether a trigger has occurred to send a reverse request message. *Id.* at Fig. 2, [0050]. If a trigger has occurred, based on the trigger parameters sent by the base station to the mobile station, the mobile station sends at 108 a reverse request message on R-REQCH. *Id.* The reverse request message includes a field, MAXIMUM_TPR, or maximum traffic-to-pilot ratio, an indication of the maximum supportable data rate of the mobile station. *Id.* at [0034, 0039]. Fong also refers to MAXIMUM_TPR as a representation of power headroom, *See id.* at [0040, 0058], and Fong teaches that power-related information can be in various forms, including "the actual power

headroom remaining the mobile station," id at [0041]. Following receipt of the reverse request message, the base station at 110 performs scheduling based on information in the reverse request message. *Id.* at Fig. 2, [0050].

B. U.S. Pat. App. Pub. No. 2006/0140154 (Kwak) (Ex. 1005)

55. The Kwak publication, titled "Method And Apparatus For Signaling User Equipment Status Information For Uplink Data Transmission In A Mobile Communication System," was filed on October 19, 2005 and published on June 29, 2006. As such, it is my understanding that Kwak qualifies as prior art to the '676 patent under 35 U.S.C. § 102(b). Kwak was not considered by the examiner during prosecution of the '676 patent.

56. Kwak discloses "a method and apparatus for signaling the transmit power status (TPS), that is, uplink channel status of a User Equipment (UE) for use in uplink packet transmission scheduling." Ex. 1005 at [0003]. Kwak teaches a Universal Mobile Telecommunication Service (UMTS) system for providing voice, data, multimedia, and wideband information to mobile subscribers or computer users. *Id.* at [0005]. Similar to the '676 patent, the UMTS architecture disclosed in Kwak consists of User Equipment (UE), the UMTS Terrestrial Radio Access Network (UTRAN), Radio Network Controllers (RNCs) 16a and 16b, and Node Bs 18a to 18d, as illustrated in Figure 1, which is reproduced below:



Id. at Fig. 1, [0006-0009]; see also Ex. 1001 at Fig. 1, 1:26-2:18.

57. Kwak teaches communicating the transit power status (TPS) information from a UE to a NodeB. Ex. 1005 at [0051]; *see also id.* at [0028-31]. "The TPS is expressed as the maximum transmit power of the UE, the maximum data rate available to the UE, or "the ratio of the maximum transmit power to the transmit power of the control channel, that is, the power margin of the UE." *Id.* at [0051]. Kwak describes the UE using the medium access control (MAC) layer to transmit the TPS to NodeB. *Id.* at [0052, 0063].

58. Kwak describes various criterion for triggering a TPS transmission from a UE to a NodeB. For example, Kwak discloses a second exemplary embodiment in which the UE transmits a TPS every TPS period 910. *Id.* at [0073-

74, 0077]. The TPS period 910 is a value which can be notified to the UE and the Node B from the RNC by upper layer signaling using Radio Resource Control (RRC) and Node B Application Part (NBAP) protocols. ***Id.*** at [0078]. Kwak also discloses a third exemplary embodiment in which the UE transmits a TPS every instance when a particular event is fulfilled. ***Id.*** at [0083]. Kwak teaches that an example of a triggering event is when the difference between a previous TPS and the current TPS exceeds a predetermined threshold. ***Id.*** at [00087]. Kwak teaches that the threshold can be notified to the UE and the Node B from the RNC by RRC and NBAP upper signaling. ***Id.*** Kwak also teaches that other events that trigger TPS transmission could be defined. ***Id.***

59. Kwak also teaches embodiments that utilize more than one triggering criterion. For example, Kwak discloses fourth and fifth embodiments using both periodic and event-based criteria for triggering TPS transmission from a UE to a Node B. ***Id.*** at [0092-0093, 0103-0104]; ***Id.*** at Figs. 11-12. In the fourth embodiment, a TPS is transmitted every TPS period 1111, as well as any time a specified event occurs. ***Id.*** at [0093, 0096]. In the fifth embodiment, a TPS is transmitted only if both the criteria are met, i.e., that a specified event has occurred and the threshold TPS period 1210 has been reached. ***Id.*** at [0104, 0107]. For both embodiments, Kwak teaches using a threshold for the difference between the current TPS and the previous TPS as an example of an event-based trigger, but

other events that trigger TPS transmission could be defined. ***Id.*** at [0097, 0108-109]. The predetermined TPS period and the predetermined event thresholds in each embodiment are adjustable via notification to the UE and the Node B from the RNC by RRC and NBAP upper signaling. ***Id.*** at [0097, 0108-109].

60. Kwak also teaches that the Node B receives the TPS and uses the information in scheduling. *E.g. id.* at [0020, 0024-0025, 0091, 0102, 0114.]

C. U.S. Patent No. 6,928,102 (Zeira) (Ex. 1007)

61. The Zeira patent, titled "User Equipment Using Combined Closed Loop/Open Loop Power Control," was filed on April 26, 2004 and issued on August 9, 2005. As such, it is my understanding that Zeira qualifies as prior art to the '676 patent under § 102(b). Zeira was not considered by the examiner during prosecution of the '676 patent.

62. Zeira discloses a wireless communication system comprising base stations 301-307 in communication with user equipments (UEs) 321-323, as illustrated in Figure 1. Ex. 1007 at 1:20-29; Fig. 1. Zeira teaches use of path loss information in the context of both open-loop and closed-loop power control systems. *Id.* at 1:59-2:14. In open-loop power control, a base station transmits to a UE a reference downlink communication and the transmission power level of that communication. *Id.* at 1:59-2:4. The UE receives the reference communication and measures its received power level. *Id.* By subtracting the received power level

from the transmission power level, a pathloss for the reference communication is determined. ***Id.*** The downlink pathloss is added to a desired received power level at the base station 301, and the UE sets its transmission power level to the determined uplink transmission power level. ***Id.***

63. In closed loop power control, typically the base station determines the signal to interference ratio (SIR) of a communication received from the UE. ***Id.*** at 2:5-14. The determined SIR is compared to a target SIR, and the base station transmits a power command based on that comparison. ***Id.*** The UE increases or decreases its transmission power level based on the received power command. ***Id.***

64. Zeira teaches that there are disadvantages to each control system as it relates to path loss. For example, in closed loop power control, if communications between UE and a base station are in a highly dynamic environment, such systems may not be able to adapt fast enough to compensate for the changes, causing performance to degrade. ***Id.*** at 2:15-23. Yet an open loop power control in a highly dynamic environment can severely degrade the overall system's performance. ***Id.*** at 2:50-55. That is because open loop control allows a UE to adjust its transmission power irrespective of the transmission power of other area UEs.

65. Zeira describes the communication station subject to power control as transmitting station 52, and the communication station receiving power controlled communications as receiving station 50, either of which or both can be a base

station or UE. *Id.* at 3:28-33. Zeira teaches using a combined closed loop/open loop power controller 108 at the transmitting station 52 *Id.*at Fig. 4, 5:1-65. By analyzing the quality of the path loss measurement—i.e., by weighting the path loss measurement based, for example, on the time delay between received and transmitted communications—the closed loop/open loop power controller 108 can utilize both closed loop and open loop power control aspects. *Id.* As Zeira teaches, "[i]f the quality of the path loss measurement is high, the system primarily acts as an open loop system. If the quality of the path loss measurement is low, the system primarily acts as a closed loop system." *Id.*

D. World Intellectual Property Organization International Publication No. WO 1996/31009 (Otten) (Ex. 1006)

66. The Otten publication, titled "Cellular Communications Power Control System," was filed on March 27, 1995 and published on October 3, 1996. As such, it is my understanding that Otten qualifies as prior art to the ’676 patent under 35 U.S.C. § 102(b). Otten was not considered by the examiner during prosecution of the ’676 patent.

67. Otten discloses a cellular communication system using two-way adaptive power control and signal quality monitoring for controlling the power output levels of transmitters. Ex. 1006 at Abstract. As Otten teaches, path loss variations can have substantial effect on signal quality, and typical communication systems compensate by setting transmit power at levels much greater than required

to overcome potential path loss that might occur. ***E.g., id.*** at 4-5. But such compensation has a number of consequences, including inter-system interference, reduced battery life, and reduced potential users. ***Id.***; ***see also id.*** at 22-23. Otten, similar to prior art systems it discusses, is directed to providing a power control system that adequately compensates for path loss without exceeding the minimum amount of power necessary to overcome such interference by adapting rapidly to, and accommodating signal fade dynamically and only as necessary. ***Id.*** at 5-6; 23.

68. Otten teaches that each receiver determines the quality of received signal and provides a local quality signal to its associated transmitter indicative of that received signal quality. ***Id.*** at 7. A path loss measure is derived from the received signal strength and from data included in each transmitted signal which indicates that transmitter's output power level. ***Id.*** "Based on the derived path loss and the transmitter's power level data, the receiver can then adjust the power output of its own associated transmitter accordingly." Id

69. Otten teaches mobile user equipment 22 in radio communication with a regional node control center 14 via ground nodes 16 under direction of the regional node control center 14, as depicted in Figure 1. ***Id.*** at 10, Figure 1. Otten teaches that in "mobile and other radio applications, fading, shadowing, and interference phenomena result in occasional, potentially significant steep increases of path loss and if severe enough, may result in data loss." ***Id.*** at 22. Otten teaches:

> an adaptive two- way power control system which continually maintains each transmitted signal power at a minimum necessary level, adapting rapidly to and accommodating such fades dynamically, and only as necessary. In controlling the transmitted signal power, the adaptive power control system at each end, near-end and far- end, includes a unique hybrid combination of two complementary sensors, the first being a near-end signal strength measure and the second being a far-end signal quality measure, both in operation simultaneously and symmetrically, with respect to each end of the subject two-way communication link.

Id. at 23. Otten teaches that both ends of the link are under adaptive power control depending at least in part on local received signal strength measurement. *Id.* A first estimate of the path loss of the outgoing path, and in turn, a first estimate of the power or change in power needed by the local transmitter, is based on combining the locally measured received signal strength with the far end telemetered transmit power level and assuming path loss reciprocity. *Id.* 23-24.

70. Otten also teaches continuous monitoring and analysis of past signal quality measurements to reduce potential sources of error. *Id.* at 24. Thus, Otten teaches that "[i]n one embodiment, the signal quality monitor includes a history compiler, situated at either the mobile unit or the nodal transceiver, that records

and processes additional factors such as past signal quality measurements, position determination of the mobile unit, past measurements of received signal strength, past determinations of the output power of the received signal and other measurements well known to those in the art to provide a more comprehensive determination of actual signal quality." ***Id.***

71. With reference to Figures 8a through 8h, Otten teaches an example of the adaptive two-way path loss system between a user "A" and a cellular node "B." ***Id.*** at 28-29. In that example, the path loss suddenly increases x dB due, for example, to mobile user A driving behind an obstruction. ***Id.*** at 28. That causes a reduction in received signal strength, as show in Fig. 8B, and because A's power level controller calculates that there has been an increase of path loss, it increases its signal level output and adds this information to its status telemeter channel. ***Id.*** at 28-29. The B receiver sees a constant received signal strength as shown in FIG. 8f but learns from the telemetered data channel that the path loss has increased x dB, adjusts its output signal level accordingly, and telemeters that information. ***Id.*** at 29. That signal increase arrives back at station A at 2T as shown in FIG. 8e thus restoring the nominal signal strength with a delay of two transit times (T). ***Id.***

72. Otten teaches that at each transceiver, the received signal is processed to to derive a signal quality deficiency, "i.e., an estimate of the change in transmit power calculated as that which would be required to just achieve the specified

minimum acceptable error rate under average conditions of fading and interference.” *Id.* at 30-31. “If the error rate is higher than acceptable, the signal quality circuit output 222 will include a power increase command signal and if the error rate less than acceptable, a transmit power reduction will be output.” *Id.* at 31.

V. INVALIDITY OF CLAIMS 1, 3, 19, 21, 33, AND 34 OF THE ’676 PATENT IN VIEW OF THE PRIOR ART

A. Ground 1: Claims 1, 19, and 33, Are Rendered Obvious By U.S. Pat. App. Pub. No. 2004/0223455 (Fong) (Ex. 1004)

73. It is my opinion that claims 1, 19, and 33 of the ’676 patent are rendered obvious by Fong (Ex. 1004) for at least the reasons given below, including the claim charts.

74. Claims 1, 19, and 33 of the ’676 patent include a number of very similar—if not identical—claim limitations, although each arranges those limitations in the context of a different claim. Claim 1, for example, is a method claim. Claim 19 is an apparatus claim comprising a processor, memory, and software configured to cause the apparatus to perform steps that include limitations that are substantially the same as the method of claim 1. Claim 33 is similarly directed at a processor, memory, and software configured to (i) receive a power control headroom report on an uplink from user equipment in response to the user equipment performing steps that include limitations that are substantially the same

as the method of claim 1, and (ii) provide a threshold adjustment signal to the user equipment in order to adjust the at least one threshold. Because of the similarly of limitations among these claims, I analyze similar limitations of multiple claims together below.

1. Claims 1 and 19

a. Claim 1: "A method comprising: determining that a set of east one triggering criterion is met"

b. Claim 19: "An apparatus comprising: at least one processor; and at least one memory including software, where the at least one memory and the software are configured, with the at least one processor, to cause the apparatus to at least: determine that a set of at least one triggering criterion is met"

75. Fong discloses mobile stations, each with a processor, memory, and software to perform various tasks, including "determining that a set of at [l]east one triggering criterion is met," as recited in claims 1 and 19. Ex. 1004 at Fig. 1, [0031]. Specifically, Fong discloses that each mobile station includes a processor 42, a storage 44, and "one or more software modules" to enable the mobile station to perform various tasks. *Id.* Among those task performed by the mobile station is determining that a set of triggers is met. *Id.* at [0043]. Fong teaches, for example, "at least three triggers for sending a reverse request message." *Id.* at [0052]. Those triggers include a buffer update trigger that requires a threshold based on a minimum duration of time since the last reverse request message, ***e.g., id.***, a trigger

based on whether a maximum duration has elapsed, ***e.g., id.*** at [0059], and a trigger based on power change, ***e.g., id.*** at [0062]. ***See also id.*** at [0044-0050].

c. Claim 1: "providing a power control headroom report on an uplink from user equipment, in response to determining that the set is met"

d. Claim 19: "provide a power control headroom report on an uplink from user equipment, in response to determining that the set is met"

76. Fong further teaches that its mobile stations "provide a power control headroom report on an uplink from user equipment, in response to determining that the set is met," as recited by claims 1 and 19. For example, with respect to the trigger REV_PDCH_REQCH_TRIGGERs[i], Fong discloses use of a field MIN_DURATION, which specifies a threshold for the minimum duration of time from the last transmitted reverse request message for the service instance i (stored as last_time_reported[i]) that must be exceeded. ***Id.*** at [0045, 0052]. If the threshold for the MIN_DURATION is met, it acts as a trigger to send a reverse request message on an uplink from the mobile station (user equipment) to the base station. ***Id.*** The reverse request message includes "a value for the MAXIMUM_TPR field based on the current power headroom of the mobile station." ***Id.*** at [0058]; ***see also id***. [0034-35, 0039-41]. Because the reverse request message provides a value for the current power headroom of the mobile station, it is a power control headroom report according to the claims.

e. Claim 1: "wherein said at least one triggering criterion include at least one threshold having been reached, wherein said at least one triggering criterion is adjustable via a signal to the user equipment"

f. Claim 19: "wherein said at least one triggering criterion include at least one threshold having been reached, wherein said at least one triggering criterion is adjustable via a signal to the apparatus"

77. As discussed above with respect to trigger REV_PDCH_REQCH_TRIGGERs[i], the field MIN_DURATION is set with a value that acts as a threshold that must be reached before a reverse request message is sent. *Id.* at [0045, 0052]. Fong teaches that the value for MIN_DURATION is "set at a value to prevent the mobile station from transmitting reverse request messages too frequently." *Id.* at [0048]. Accordingly, the value MIN_DURATION is a threshold that, when met, can trigger the transmittal of a reverse request message.

78. Fong also teaches that MIN_DURATION is adjustable via messages from the base station. *See id.* [0043] ("The base station sends (at 104) various messages to the mobile station, with such message(s) containing trigger parameters that are used by the mobile station to trigger the transmission of a reverse request message on R-REQCH."). Because Fong teaches that the trigger parameters are sent from the base station to the mobile station, one of ordinary skill in the art would understand that the parameters are adjustable.

g. Claim 1: "the set of at least one triggering criterion comprises a criterion being met based on reaching a threshold of the at least one threshold of k transmission time intervals following a previous power control headroom report, wherein k is an integer, and wherein said at least one threshold adjustable via the signal comprises adjusting the threshold integer k"

h. Claim 19: "the set of at least one triggering criterion comprises a criterion being met based on reaching a threshold of the at least one threshold of k transmission time intervals following a previous power control headroom report, wherein k is an integer, and wherein said at least one threshold adjustable via the signal comprises adjusting the threshold integer k"

79. Fong also discloses that "the set of at least one triggering criterion comprises a criterion being met based on reaching a threshold of the at least one threshold of k transmission time intervals following a previous power control headroom report, wherein k is an integer, and wherein said at least one threshold adjustable via the signal comprises adjusting the threshold integer k," as recited as recited by claims 1 and 19. As discussed above, the field MIN_DURATION is set with a value that acts as a threshold that must be reached before a reverse request message is sent. *Id.* at [0045, 0052]. Fong teaches that the value for MIN_DURATION is "set at a value to prevent the mobile station from transmitting reverse request messages too frequently," *id.* at [0048], and it is adjustable via messages from the base station, *See id.* [0043]. Fong describes that value as a "specified time duration," which is added to the time that a reverse request message was last sent (stored as last_time_reported[i]) and the sum compared to the current system time to determine if the triggering threshold has been reached. *Id.* at [0052]. Such a period of time may be expressed in only a

limited variety of units, many of which are related to one another. Two such units of time would frame and transmission time intervals.

80. Moreover, Fong teaches that its disclosed embodiments can be utilized in many types of wireless protocols, including CDMA, TDMA, and UMTS (Universal Mobile Telecommunications) protocols. *Id.* at [0018]. One of ordinary skill in the art would have understood that transmission time interval is a parameter in UMTS and other digital telecommunication networks. Indeed, the ’676 patent admits that UMTS radio networks were prior art to the ’676 patent, and that such a protocol includes a period of time called the transmission time interval (TTI). Ex. 1001 at 1:26-30, 2:19-29. Thus, one of ordinary skill in the art reading Fong’s disclosure of a threshold value MIN_DURATION would have understood that disclosure in the context of a UMTS system to teach that the specified time duration for MIN_DURATION is a value for k transmission time intervals, where k is an integer.

81. In addition, because Fong teaches that MIN_DURATION is adjustable via messages from the base station, one of ordinary skill in the art would have understood that such adjustment would involve changing the value k. One of ordinary skill in the art, knowing that the period of time must be adjustable and understanding that Fong’s teaching relates to UMTS, would have understood Fong’s disclosure as teaching the commonly used TTI period as a unit of time, set

a particular number of TTIs, and that the period would be adjustable by changing the number of TTIs, i.e., adjusting the number of "k" TTIs where k is an integer.

82. Alternatively, it would have also been obvious to one of ordinary skill in the art to utilize k transmission time intervals, where k is an integer, as the value for MIN_DURATION, and to adjust MIN_DURATION by adjusting the value k. As discussed above, use of TTI as a measure of time, particularly in the context of the UMTS system taught in Fong, was well known in the art and would have been considered and used based on Fong's teaching that the value MIN_DURATION was adjustable via messages from the base station. One of skill in the art would further have considered and used a value "k" for MIN_DURATION to represent a particular number of TTIs (where k is an integer) as the simplest way of adjusting MIN_DURATION, as taught by Fong.

83. Thus, Fong discloses and renders obvious the method and apparatus of claims 1 and 19 of the '676 patent.

2. Claim 33

a. Claim 33: "A network element comprising: at least one processor; and at least one memory including software, where the at least one memory and the software are configured, with the at least one processor, to cause the network element to at least: receive a power control headroom report on an uplink from user equipment"

84. Fong discloses the network element of claim 33. For example, Fong teaches base stations, each with at least one processor and one memory including

software. Ex. 1004 at Fig. 1, [0031] ("The base station 19 also includes a processor 48 and a storage 50 (or multiple processors and storages). The scheduler 40 can be a software module that is executable on the processor 48.").

85. Fong also teaches that the scheduler 40 in base station 19 uses the information provided in the reverse request message to determine the bandwidth requirements of the mobile stations and to determine how much of the bandwidth of the reverse wireless link will be taken up by the autonomous mode mobile stations. ***Id.*** at [0033]. The reverse request message includes "a value for the MAXIMUM_TPR field based on the current power headroom of the mobile station." ***Id.*** at [0058]; ***see also id.*** [0034, 0039-41]. The reverse request message is sent to the base station on an uplink from the mobile station (user equipment) to the base station. ***Id.*** at [0045, 0052]. Thus, Fong discloses a network element including at least a processor, memory, and software configured to cause the network element to at least "receive a power control headroom report on an uplink from user equipment," as recited by claim 33.

b. Claim 33: "in response to the user equipment determining that a set of at least one triggering criterion is met because at least one threshold has been reached, wherein the set of at least one triggering criterion comprises criterion being met based on reaching a threshold of the at least one threshold of k transmission time intervals following a previous power control headroom report, wherein k is an integer and wherein said at least one threshold adjustable via the signal comprises adjusting the threshold integer k"

86. As discussed above in the context of claims 1 and 19, Fong teaches that the reverse request message is sent by the mobile station "in response to the user equipment determining that a set of at least one triggering criterion is met because at least one threshold has been reached, wherein the set of at least one triggering criterion comprises criterion being met based on reaching a threshold of the at least one threshold of k transmission time intervals following a previous power control headroom report, wherein k is an integer and wherein said at least one threshold adjustable via the signal comprises adjusting the threshold integer k," as recited by claim 33. Fong teaches, for example, at least three triggers for sending a reverse request message. Ex. 1004 at [0044-49, 0052, 0059, 0062]. With respect to the trigger REV_PDCH_REQCH_TRIGGERs[i], Fong discloses use of a field MIN_DURATION, which specifies a threshold for the minimum duration of time from the last transmitted reverse request message for the service instance i (stored as last_time_reported[i]) that must be exceeded. *Id.* at [0045, 0052]. Fong teaches that the value for MIN_DURATION is "set at a value to prevent the mobile station from transmitting reverse request messages too frequently," *id.* at [0048], and it is adjustable via messages from the base station. ***See id.*** [0043].

87. Fong describes that value as a "specified time duration," which is added to the time that a reverse request message was last sent (stored as last_time_reported[i]) and the sum compared to the current system time to

determine if the triggering threshold has been reached. ***Id.*** at [0052]. Such a period of time may be expressed in only a limited variety of units, many of which are related to one another. Two such units of time would frame and transmission time intervals.

88. Moreover, Fong teaches that its disclosed embodiments can be utilized in many types of wireless protocols, including CDMA, TDMA, and UMTS (Universal Mobile Telecommunications) protocols. ***Id.*** at [0018]. One of ordinary skill in the art would have understood that transmission time interval is a parameter in UMTS and other digital telecommunication networks. Indeed, the ’676 patent admits that UMTS radio networks were prior art to the ’676 patent, and that such a protocol includes a period of time called the transmission time interval (TTI). Ex. 1001 at 1:26-30, 2:19-29. Thus, one of ordinary skill in the art reading Fong’s disclosure of a threshold value MIN_DURATION would have understood that disclosure in the context of a UMTS system to teach that the specified time duration for MIN_DURATION is a value for k transmission time intervals, where k is an integer.

89. In addition, because Fong teaches that MIN_DURATION is adjustable via messages from the base station, one of ordinary skill in the art would have understood that such adjustment would involve changing the value k. One of ordinary skill in the art, knowing that the period of time must be adjustable and

understanding that Fong's teaching relates to UMTS, would have understood Fong's disclosure as teaching the commonly used TTI period as a unit of time, set a particular number of TTIs, and that the period would be adjustable by changing the number of TTIs, i.e., adjusting the number of "k" TTIs where k is an integer.

90. Alternatively, it would have also been obvious to one of ordinary skill in the art to utilize k transmission time intervals, where k is an integer, as the value for MIN_DURATION, and to adjust MIN_DURATION by adjusting the value k. As discussed above, use of TTI as a measure of time, particularly in the context of the UMTS system taught in Fong, was well known in the art and would have been considered and used based on Fong's teaching that the value MIN_DURATION was adjustable via messages from the base station. One of skill in the art would further have considered and used a value "k" for MIN_DURATION to represent a particular number of TTIs (where k is an integer) as the simplest way of adjusting MIN_DURATION, as taught by Fong. It therefore would have also been obvious to one of ordinary skill in the art to utilize k transmission time intervals, where k is an integer, as the value for MIN_DURATION.

c. Claim 33: "provide a threshold adjustment signal to the user equipment in order to adjust the at least one threshold"

91. Fong teaches that the base station is able to at least "provide a threshold adjustment signal to the user equipment in order to adjust the at least one threshold," as recited in claim 31. Fong teaches that the base station sends "various

messages to the mobile station, with such message(s) containing trigger parameters that are used by the mobile station to trigger the transmission of a reverse request message on R-REQCH." *Id.* at [0043]. The threshold MIN_DURATION is among the trigger parameters that are sent by the base station to the mobile station. *Id.* at [0044-45].

92. Thus, Fong discloses and renders obvious the network element of claim 33 of the '676 patent.

3. Claim Charts for Claims 1, 19, and 33

93. A summary of relevant sections of Fong cited above are included in the table attached here as Attachment B for ease of reference, although other examples in Fong (as well as the overall teaching of Fong) further support my opinion.

B. Ground 2: Claims 1, 19, and 33, Are Rendered Obvious By U.S. Pat. App. Pub. No. 2006/0140154 (Kwak) (Ex. 1005)

94. It is my opinion that claims 1, 19, and 33 of the '676 patent are rendered obvious by Kwak (Ex. 1005) for at least the reasons given below, including the claim charts.

95. Claims 1, 19, and 33 of the '676 patent include a number of very similar—if not identical—claim limitations, although each arranges those limitations in the context of a different claim. Claim 1, for example, is a method claim. Claim 19 is an apparatus claim comprising a processor, memory, and

software configured to cause the apparatus to perform steps that include limitations that are substantially the same as the method of claim 1. Claim 33 is similarly directed at a processor, memory, and software configured to (i) receive a power control headroom report on an uplink from user equipment in response to the user equipment performing steps that include limitations that are substantially the same as the method of claim 1, and (ii) provide a threshold adjustment signal to the user equipment in order to adjust the at least one threshold. Because of the similarly of limitations among these claims, I analyze similar limitations of multiple claims together below.

1. Claims 1 and 19

a. Claim 1: "A method comprising: determining that a set of east one triggering criterion is met"

b. Claim 19: "An apparatus comprising: at least one processor; and at least one memory including software, where the at least one memory and the software are configured, with the at least one processor, to cause the apparatus to at least: determine that a set of at least one triggering criterion is met"

96. Kwak discloses user equipment (UE) that performs various tasks, including "determining that a set of at [l]east one triggering criterion is met," as recited in claims 1 and 19. E.g., Ex. 1005 at Fig. 1, [0073-74, 0077, 0083, 0087, 0092-0093, 0103-0104]. Kwak teaches that UE is used by mobile subscribers and computer users, and Kwak illustrates UE using images of mobile telephones. ***Id.*** at [0007], Figs. 3-4. The generation of TPS information and transmission of TPS

from the UE to the Node B is performed by the UE. ***See id.*** at Figs. 5-6, [0020, 0051-52, 0056-57]. One of ordinary skill in the art would understand Kwak's teaching of UE to each inherently include at least a processor, memory, and software for performing these tasks. That is, the UE in Kwak must necessarily include and use a processor, memory, and software to generate TPS information, determine whether to send it, and transmit the TPS from the UE to the Node B. The mobile telephones at the time of Kwak—which was filed in 2005 and published in 2006—necessarily included a processor, memory, and software to provide the functionality of communicating wirelessly with a node and to send and receive information from the telecommunication system. For the UE taught by Kwak to perform the tasks taught by Kwak—namely, to generate TPS information, determine whether to send it, and transmit the TPS from the UE to the Node B—it would likewise necessarily require that the mobile telephone include a processor, memory, and software that performs that functionality. Indeed, such functionality could not be achieved by the UE without at least a processor, memory, and software. Thus, one ordinary skill in the art would understand Kwak's teaching of the UE to necessarily include such components, i.e., those components are inherent in Kwak's disclosures.

97. Alternatively, it would have been obvious to one of ordinary skill in the art to utilize a processor, memory, and software to generate TPS information,

determine whether to transmit it, and transmit the TPS information from the UE to the Node B. In the context of a typical UMTS as described by Kwak, it was well known to those of skill in the art that the UE in such a system typically involved mobile telephones containing at least one processor, memory, and software capable of performing these tasks, as discussed above. The skilled artisan, reading Kwak's disclosure, would have been motivated to utilize the components and capabilities of typical UE to perform these tasks. It therefore would have been obvious to one of ordinary skill in the art for the UE to include a processor, memory, and software to perform the tasks described by Kwak.

98. Kwak teaches that the UE determines if at least one triggering criterion is met. E.g., Ex. 1005 at [0073-81, 0092-0114]. Kwak describes various examples of triggering criterion for transmission of TPS information, including a time-based criterion (a TPS period), an event-based criterion using threshold values, and embodiments using combinations of both periodic and event-based criterion. ***E.g., id.*** at [0073-74, 0077, 0083, 0087, 0092-0093, 0103-0104].

c. Claim 1: "providing a power control headroom report on an uplink from user equipment, in response to determining that the set is met"

d. Claim 19: "provide a power control headroom report on an uplink from user equipment, in response to determining that the set is met"

99. Kwak further teaches that the UE "provide a power control headroom report on an uplink from user equipment, in response to determining that the set is

met," as recited by claims 1 and 19. For example, Kwak discloses fourth and fifth embodiments using both periodic and event-based criteria for triggering TPS transmission from a UE to a Node B. ***Id.*** at [0092-0093, 0103-0104]; ***id.*** at Figs. 11-12. In the fourth embodiment, a TPS is transmitted every TPS period 1111, as well as any time a specified event occurs. ***Id.*** at [0093, 0096]. In the fifth embodiment, a TPS is transmitted only if both the criteria are met, i.e., that a specified event has occurred and the threshold TPS period 1210 has been reached. ***Id.*** at [0104, 0107]. Alternatively, Kwak teaches a second embodiment using a set of one triggering criteria in which the UE transmits a TPS every TPS period 910. ***Id.*** at [0073-74, 0077]. The TPS, or transmit power status, is expressed as the maximum transmit power of the UE, the maximum data rate available to the UE, or "the ratio of the maximum transmit power to the transmit power of the control channel, that is, the power margin of the UE." ***Id.*** at [0051]. Thus, Kwak teaches that its TPS represents a measure of how close the terminal's transmission power is relative to its maximum transmission power. One of ordinary skill in the art would understand Kwak's TPS to constitute a power control headroom report according to the claims.

e. Claim 1: "wherein said at least one triggering criterion include at least one threshold having been reached, wherein said at least one triggering criterion is adjustable via a signal to the user equipment"

f. Claim 19: "wherein said at least one triggering criterion include at least one threshold having been reached, wherein said at least one triggering criterion is adjustable via a signal to the apparatus"

100. Kwak teaches that the UE determines if at least one triggering criterion is met. E.g., Ex. 1005 at [0073-81, 0092-0114]. Kwak describes various examples of triggering criterion for transmission of TPS information, including a time-based criterion (a TPS period), an event-based criterion using threshold values, and embodiments using combinations of both periodic and event-based criterion. ***E.g., id.*** at [0073-74, 0077, 0083, 0087, 0092-0093, 0103-0104]; see also ***id.*** at Figs. 9, 11-12. Kwak teaches that the TPS period trigger is adjustable through notification to the UE and the Node B from the RNC by upper layer signaling using RRC and NBAP protocols. ***Id.*** at [0078, 0097, 0109]. Similarly, Kwak teaches that the threshold for event-based triggers can be adjustable through notification to the UE and the Node B from the RNC by upper layer signaling using RRC and NBAP protocols. ***Id.*** at [0097, 0108].

g. Claim 1: "the set of at least one triggering criterion comprises a criterion being met based on reaching a threshold of the at least one threshold of k transmission time intervals following a previous power control headroom report, wherein k is an integer, and wherein said at least one threshold adjustable via the signal comprises adjusting the threshold integer k"

h. Claim 19: "the set of at least one triggering criterion comprises a criterion being met based on reaching a threshold of the at least one threshold of k transmission time intervals following a previous power control headroom report, wherein k is an integer, and wherein said at least one threshold adjustable via the signal comprises adjusting the threshold integer k"

101. Kwak also discloses that "the set of at least one triggering criterion comprises a criterion being met based on reaching a threshold of the at least one threshold of k transmission time intervals following a previous power control headroom report, wherein k is an integer, and wherein said at least one threshold adjustable via the signal comprises adjusting the threshold k," as recited as recited by claims 1 and 19. As discussed above, the TPS period is a threshold that must be reached before a subsequent TPS is sent. Ex. 1005 at [0077-78, 0096, 0099, 0107, 0110-111]; *see also id.* at Figs. 9, 11-12.

102. Kwak teaches that the TPS period is set as a certain number of transmission time intervals following a previous power control headroom report. For example, the TPS period 910 in the second embodiment, the TPS period 1111 in the fourth embodiment, and the TPS period 1210 are each measured in transmission time intervals from a previous TPS, as illustrated in Figures 9, 11, and 12 below:

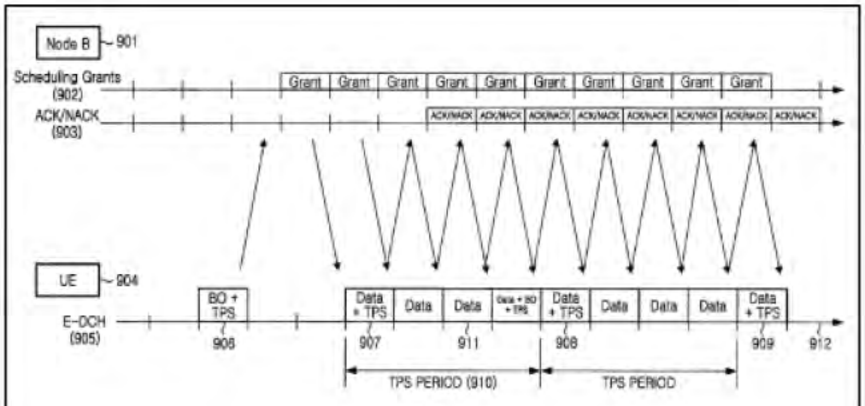


FIG.9

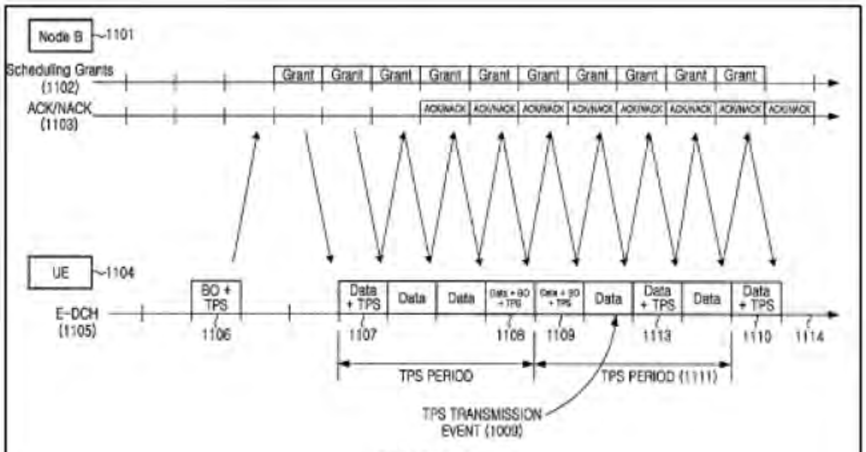


FIG.11

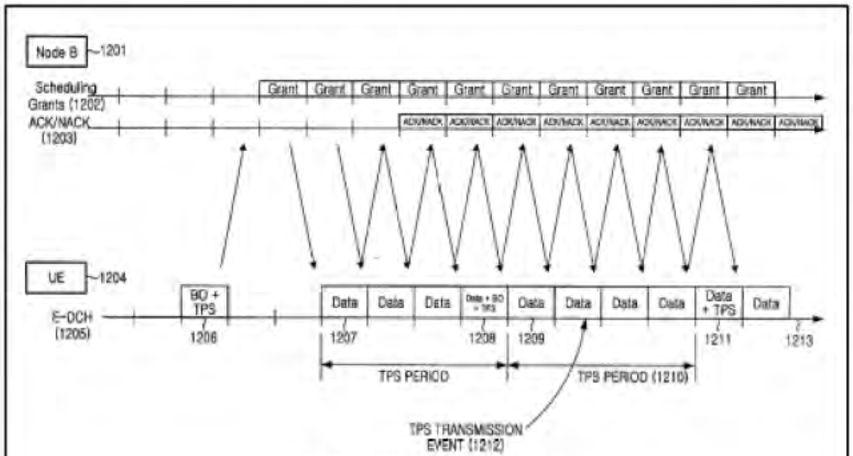


FIG.12

Id. at Figs. 9, 11-12; see also [0077-78, 0096, 0098-99, 0107, 0109-110]. As one of ordinary skill in the art would recognize, these figures illustrate a typical system utilizing transmission time intervals (TTIs) as a period of time, as reflected by the blocks of time reflected along each timeline corresponding to each interval of transmission. Kwak itself refers to these blocks variously as "time intervals" and "transmission time intervals" in various instances, both referring to the same unit of measure. *E.g., id.* at [0077-80, 0096, 0098-0101, 0107, 0109-0113]. Kwak teaches that the TPS period is set at a particular number of TTIs from a previous TPS report, which in the Kwak examples is an integer. Thus, one of ordinary skill in the art reading Kwak's disclosure of a TPS period would have understood that disclosure in the context of a UMTS system to teach that the period is a value for k transmission time intervals measured from a previous TPS report, where k is an integer.

103. Moreover, because Kwak teaches that the TPS period is adjustable via notification to the UE and the Node B by RRC and NBAP upper signaling, one of ordinary skill in the art would have understood that such adjustment would involve changing the value k. That is, one of ordinary skill in the art, knowing that the period of time must be adjustable and understanding that Kwak teaches using a particular number of TTI's to represent the TPS period, would have understood Kwak's disclosure as teaching the commonly used TTI period as a unit of time for the TPS period, set at a particular number of TTIs, and that the period would be adjustable by changing the number of TTIs, i.e., adjusting the number of "k" TTIs where k is an integer.

104. Alternatively, it would have also been obvious to one of ordinary skill in the art to utilize k transmission time intervals, where k is an integer, as the value for TPS period, and to adjust TPS period by adjusting the value k. As discussed above, use of TTI as a measure of time, particularly in the context of the UMTS

system taught in Kwak, was well known in the art and would have been considered and used based on Kwak's teaching that the value "TPS period" was adjustable via notification. One of skill in the art would further have considered and used a value "k" for TPS period to represent a particular number of TTIs (where k is an integer) as the simplest way of adjusting TPS period based on notification, as taught by Kwak.

105. Thus, Kwak discloses and renders obvious the method and apparatus of claims 1 and 19 of the '676 patent.

2. Claim 33

a. Claim 33: "A network element comprising: at least one processor; and at least one memory including software, where the at least one memory and the software are configured, with the at least one processor, to cause the network element to at least: receive a power control headroom report on an uplink from user equipment"

106. Kwak teaches RNCs and Node Bs that receive TPS information transmitted by the UE. Ex. 1005 at Figs. 1, 3-4, [0007-08, 0020]. The RNCs control the underlying Node Bs and allocate or manage radio resources to the Node Bs. *Id.* at [0008]. The UEs establish a radio connection with the Node Bs. *Id.* The Node Bs and RNCs receive TPS information from the UEs and use the TPS information for scheduling. *Id.* at [0020, 0051-52, 0062-64]; *see also id.* at [0102, 0114]. One of ordinary skill in the art would understand Kwak's teaching of Node Bs and RNCs to each inherently include at least a processor, memory, and software

for performing these tasks. That is, the Node Bs and RNCs in Kwak must necessarily include and use a processor, memory, and software to receive TPS information and use it for scheduling. The Node Bs and RNCs at the time of Kwak—which was filed in 2005 and published in 2006—necessarily included a processor, memory, and software to provide the functionality of communicating wirelessly with a UE and to send and receive information from the telecommunication system. For the Node Bs and the RNCs taught by Kwak to perform the tasks taught by Kwak—namely, to receive TPS information from the UEs, determine whether to make a power adjustment or whether to change parameters, and communicate those changes to the UEs—these components would likewise necessarily require that the Node Bs and RNCs each include a processor, memory, and software that performs that functionality. Indeed, such functionality could not be achieved by these components without at least a processor, memory, and software. Thus, one ordinary skill in the art would understand Kwak's teaching of the Node Bs and RNCs to necessarily include such components, i.e., those components are inherent in Kwak's disclosures.

107. Alternatively, it would have been obvious to one of ordinary skill in the art to utilize a processor, memory, and software in the Node Bs and RNCs to receive TPS information and use it for scheduling. In the context of a typical UMTS as described by Kwak, it was well known to those of skill in the art that the

Node Bs and RNCs utilized hardware components that included at least one processor, memory, and software capable of performing these tasks. The skilled artisan, reading Kwak's disclosure, would have been motivated to utilize the components and capabilities of these hardware components to perform these tasks, and the skilled artisan would have recognized that such tasks could be completed by the Node Bs, the RNCs, or both as a matter of design choice within the skilled artisan's capabilities. It therefore would have been obvious to one of ordinary skill in the art for the Node Bs and the RNCs to each include a processor, memory, and software to perform the tasks described by Kwak.

108. Kwak also teaches that the Node Bs and RNCs use the information provided in the TPS to determine the scheduling requirements of the UEs. ***Id.*** at [0020-21, 0024-25, 0062-64], Fig. 7. The TPS, or transmit power status, is expressed as the maximum transmit power of the UE, the maximum data rate available to the UE, or "the ratio of the maximum transmit power to the transmit power of the control channel, that is, the power margin of the UE." ***Id.*** at [0051]. The TPS is sent to a Node B and RNC on an uplink from the user equipment. ***Id.*** at [0020, 0051-52, 0062-64]; ***see also id.*** at [0102, 0114]. Thus, Kwak discloses a network element including at least a processor, memory, and software configured to cause the network element to at least "receive a power control headroom report on an uplink from user equipment," as recited by claim 33.

b. Claim 33: "in response to the user equipment determining that a set of at least one triggering criterion is met because at least one threshold has been reached, wherein the set of at least one triggering criterion comprises criterion being met based on reaching a threshold of the at least one threshold of k transmission time intervals following a previous power control headroom report, wherein k is an integer and wherein said at least one threshold adjustable via the signal comprises adjusting the threshold integer k"

109. As discussed above in the context of claims 1 and 19, Kwak teaches that the TPS is sent by the UE "in response to the user equipment determining that a set of at least one triggering criterion is met because at least one threshold has been reached, wherein the set of at least one triggering criterion comprises criterion being met based on reaching a threshold of the at least one threshold of k transmission time intervals following a previous power control headroom report, wherein k is an integer and wherein said at least one threshold adjustable via the signal comprises adjusting the threshold integer k," as recited by claim 33. Kwak teaches, for example, triggering criterion for transmission of TPS information, including a time-based criterion (a TPS period), event-based criterion using threshold values, and embodiments using combinations of both periodic and event-based criterion. ***E.g., id.*** at [0073-74, 0077, 0083, 0087, 0092-0093, 0103-0104]. In the fourth embodiment, a TPS is transmitted every TPS period 1111, as well as any time a specified event occurs. ***Id.*** at [0093, 0096]. In the fifth embodiment, a TPS is transmitted only if both the criteria are met, i.e., that a specified event has occurred and the threshold TPS period 1210 has been reached. ***Id.*** at [0104, 0107].

Alternatively, Kwak teaches a second embodiment using a set of one triggering criteria in which the UE transmits a TPS every TPS period 910. *Id.* at [0073-74, 0077].

110. Kwak teaches that the TPS period is set as a certain number of transmission time intervals following a previous power control headroom report. For example, the TPS period 910 in the second embodiment, the TPS period 1111 in the fourth embodiment, and the TPS period 1210 are each measured in transmission time intervals from a previous TPS, as illustrated in Figures 9, 11, and 12 below:

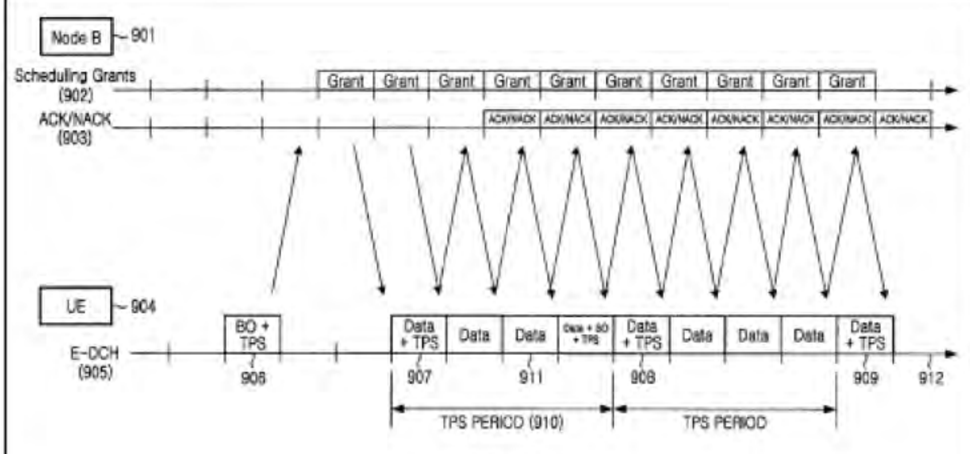


FIG.9

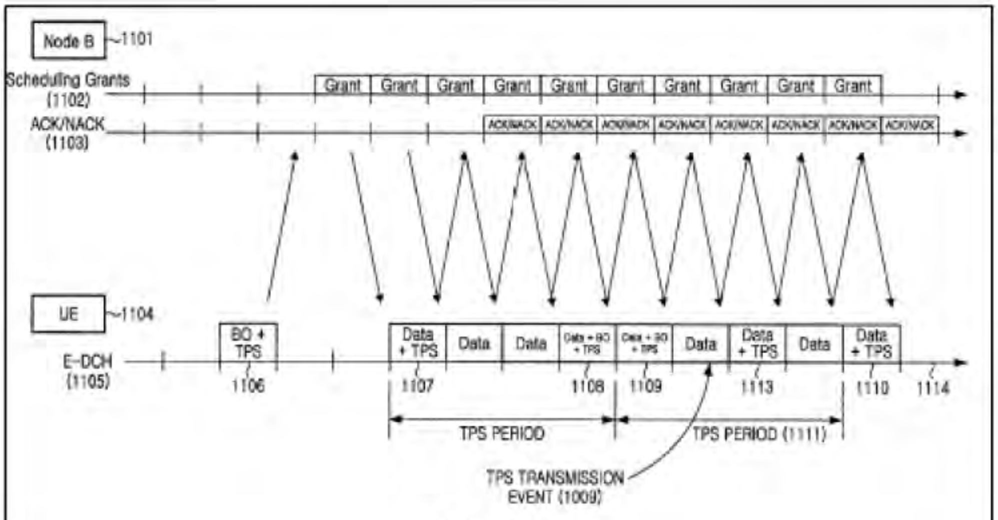


FIG.11

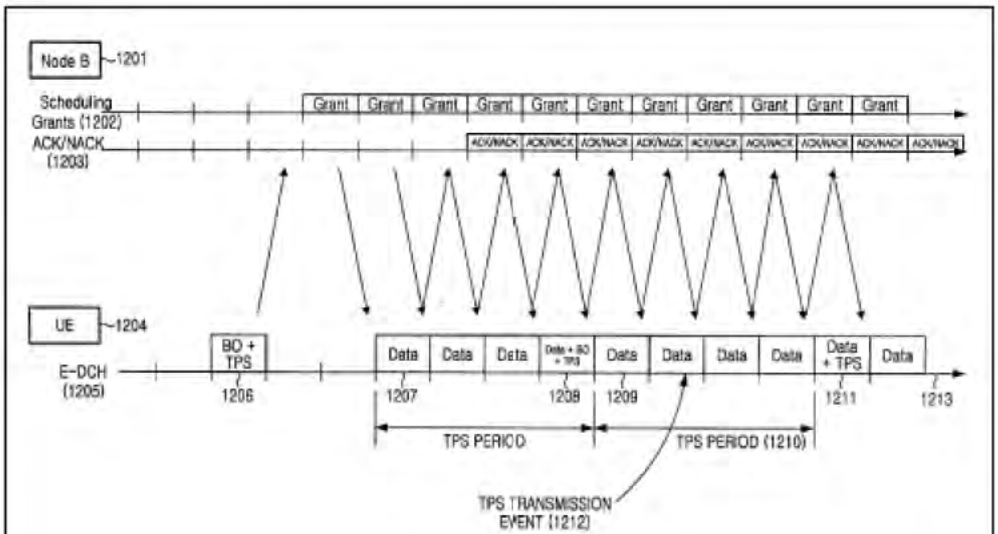


FIG.12

Id. at Figs. 9, 11-12; see also [0077-78, 0096, 0098-99, 0107, 0109-110]. As one of ordinary skill in the art would recognize, these figures illustrate a typical system utilizing transmission time intervals (TTIs) as a period of time, as reflected by the blocks of time reflected along each timeline corresponding to each interval of transmission. Kwak itself refers to these blocks variously as "time intervals" and “transmission time intervals” in various instances, both referring to the same unit of measure. ***E.g., id.*** at [0077-80, 0096, 0098-0101, 0107, 0109-0113]. Kwak teaches that the TPS period is set at a particular number of TTIs from a previous TPS report, which in the Kwak examples is an integer. Thus, one of ordinary skill in the art reading Kwak’s disclosure of a TPS period would have understood that disclosure in the context of a UMTS system to teach that the period is a value for k transmission time intervals measured from a previous TPS report, where k is an integer.

111. Moreover, because Kwak teaches that the TPS period is adjustable via notification to the UE and the Node B by RRC and NBAP upper signaling, one of ordinary skill in the art would have understood that such adjustment would involve changing the value k. That is, one of ordinary skill in the art, knowing that the period of time must be adjustable and understanding that Kwak teaches using a particular number of TTI’s to represent the TPS period, would have understood Kwak’s disclosure as teaching the commonly used TTI period as a unit of time for the TPS period, set at a particular number of TTIs, and that the period would be adjustable by changing the number of TTIs, i.e., adjusting the number of “k” TTIs where k is an integer.

112. Alternatively, it would have also been obvious to one of ordinary skill in the art to utilize k transmission time intervals, where k is an integer, as the value

for TPS period, and to adjust TPS period by adjusting the value k. As discussed above, use of TTI as a measure of time, particularly in the context of the UMTS system taught in Kwak, was well known in the art and would have been considered and used based on Kwak's teaching that the value "TPS period" was adjustable via notification. One of skill in the art would further have considered and used a value "k" for TPS period to represent a particular number of TTIs (where k is an integer) as the simplest way of adjusting TPS period based on notification, as taught by Kwak.

c. Claim 33: "provide a threshold adjustment signal to the user equipment in order to adjust the at least one threshold"

113. Kwak teaches that the base station is able to at least "provide a threshold adjustment signal to the user equipment in order to adjust the at least one threshold," as recited in claim 31. Kwak teaches that the TPS period triggers and event-based threshold triggers are adjustable through notification to the UE and the Node B from the RNC by upper layer signaling using RRC and NBAP protocols. ***Id.*** at [0078, 0097, 0108-109]. The notification to the UE containing such adjustment is communicated to the UE by the Node B via the radio connection established between the UE and Node B. ***Id.*** at [0008].

114. Thus, Kwak discloses and renders obvious the network element of claim 33 of the '676 patent.

3. Claim Charts for Claims 1, 19, and 33

115. A summary of relevant sections of Kwak cited above are included in the table attached here as Attachment C for ease of reference, although other examples in Kwak (as well as the overall teaching of Kwak) further support my opinion.

C. Ground 3: Claims 3, 21, and 34 Are Rendered Obvious Over Fong In View of Zeira and Otten

116. It is my opinion that claims 3, 21, and 34 of the ’676 patent are rendered obvious over Fong (Ex. 1004) in view of Zeira (Ex. 1007) and Otten (Ex. 1006) for at least the reasons given below.

117. The limitations of claims 1, 19, and 33 are disclosed and rendered obvious by Fong, as described in Part V.A, above. Claims 3, 21, and 34 depend, respectively, from those claims and add that the “set of at least one triggering criterion comprises a triggering criterion such that an absolute difference between current and most recent path-loss measurements has reached a threshold of difference.” Ex. 1001 at claims 3, 21; see also claim 34 (“set comprises a criterion such that an absolute difference between current and most recent path-loss measurements has reached a threshold of difference”).

118. Fong teaches embodiments that utilize more than one triggering criterion for sending a reverse request message. Fong teaches, for example, “at least three triggers for sending a reverse request message.” *Id.* at [0052]. Those triggers include a buffer update trigger that requires a threshold based on a

minimum duration of time since the last reverse request message, ***e.g., id.***, a trigger based on whether a maximum duration has elapsed, ***e.g., id.*** at [0059], and a trigger based on power change, ***e.g., id.*** at [0062]; ***see also id.*** at Fig. 2, [0044-0049].

119. Those of ordinary skill in the art understood that in open-loop power control, the UE measures the power of the forward link pilot channel to determine the UE's reverse channel transmit power setting. Ex. 1001 at 3:1-8; Ex. 1007 at 1:59-2:4. Path loss measured in the forward direction (i.e., path loss measured on the downlink from the Node B to the UE) is a general indicator of path loss in the reverse direction (i.e., path loss on the uplink from the UE to the Node B). Ex. 1001 at 4:2-7. That is because the same factors affecting path loss in the downlink—antenna pattern, distance, and shadowing—affect path loss in the uplink.

120. Those of ordinary skill in the art also understood that in closed-loop power control, the UE's reverse channel transmit power setting is controlled by the Node B (or base station) based on the measured signal to interference ratio (SIR) of a communication received from the UE. Ex. 1001 at 3:1-8; Ex. 1007 at 2:5-14. As the '676 patent admits, the trend in the prior art was to use both an open loop power control mechanism at the terminal as well as options for the Node Bs to send closed loop power control correction commands to the terminal. Ex. 1001 at 3:15-18. As described above, Zeira teaches an example for combining closed loop

and open loop control based on path loss measurements at the UE. Ex. 1007 at Fig. 4, 5:1-65. Other prior art systems were likewise directed combining aspects of closed loop and open loop control.

121. Those of ordinary skill in the art understood that the UE needs to continuously monitor for changes in the environment, such as highly dynamic environments that may affect path loss, as taught by Zeira and Otten. See, e.g., Ex. 1007 at 2:15-25, 2:50-58; Ex. 1006 at 4-7. But those of ordinary skill in the art also appreciated the need to balance transmission power for a particular UE with the need to maintain efficiency of the overall system. See, e.g., Ex. 1004 at [0028-29, 0033, 0024]; Ex. 1007 at 1:45-58, 2:15-25, 2:50-58; Ex. 1006 at 4-7. As Otten teaches, in the context of path loss, one goal is to "provide a power control system to compensate for fading and interference without exceeding the minimum amount of power necessary to overcome such interference." Ex. 1006 at 5-6; ***see also id.*** at 30-31.

122. Otten further teaches using a given path loss measurement in conjunction with previous measurements to overcome sources of error associated with power adjustment based upon path loss alone:

> In one embodiment, the signal quality monitor includes a history compiler, situated at either the mobile unit or the nodal transceiver, that records and processes additional factors such as past signal

> quality measurements, position determination of the mobile unit, past measurements of received signal strength, past determinations of the output power of the received signal and other measurements well known to those in the art to provide a more comprehensive determination of actual signal quality. The difference is interpreted as a longer-term signal level deficiency.

Ex. 1006 at 26-27. One of ordinary skill in the art would understand Otten to teach and disclose monitoring for changes in RF environment and comparing those changes to previous path loss measurements to determine if a given change in path loss may require a change in transmission power.

123. As described above, Otten also teaches using changes in the forward link pilot channel received power level to indicate a change in the RF environment, which will affect both the forward and reverse channels. *See id.* at 28-29. Otten teaches that at each transceiver, the received signal is processed to derive a signal quality deficiency, "i.e., an estimate of the change in transmit power calculated as that which would be required to just achieve the specified minimum acceptable error rate under average conditions of fading and interference." *Id.* at 30-31. "If the error rate is higher than acceptable, the signal quality circuit output 222 will include a power increase command signal and if the error rate less than acceptable, a transmit power reduction will be output." *Id.* at 31.

124. It would have been obvious to one of ordinary skill in the art to combine Fong's teaching of triggering parameters for transmission of reverse request messages with Zeira's and Otten's teachings of the use of path loss measurements at the UE in open loop and closed loop power control systems to include in the set of triggering criterion a triggering criterion based on the threshold of absolute difference between current and most recent path loss measurements. Creating such a criterion and implementing it the Fong system would have been well within the capabilities of one of ordinary skill in the art, and choosing what criteria to use would have been a design choice by the system designer balancing the tradeoffs amongst various other criteria. Thus, it would have been obvious use a threshold of an absolute difference in path loss as a one of a set of triggering criterion as required by claims 3, 21, and 34.

125. One of ordinary skill in the art would have been motivated to combine Fong with the teachings of Zeira and Otten. Persons of ordinary skill in the art understood and appreciated the tradeoffs associated with sending power headroom reports more or less frequently. See, e.g., Ex. 1001 at 3:60-65. Fong, in particular, teaches the use of limiting parameters and criteria for determining when to send power control headroom reports. E.g., Exhibit 1005 at [0044-49, 0052, 0059, 0062]. At the same time, those of skill in the art also understood that power adjustments may be needed to compensate for path loss measured at the UE, and

that power adjustments based on path loss in a closed loop control system could only be triggered by reporting power status information to the base station. E.g., Ex. 1001 at 3:1-14, 4:2-12; Ex. 1007 at 1:59-2:14. Thus, one of ordinary skill in the art considering Fong's use of limiting parameters for sending power control headroom reports, as well as its express teaching to consider other criteria, would have been motivated to consider path loss measurements as one such criterion.

126. Indeed, the ordinarily skilled artisan would have understood the relationship between path loss and transmit power, as well as the relationship between power headroom reporting, transmit power control, and system efficiency, and been motivated to consider both relationships in designing an efficient system. That is, the skilled artisan would have understood that a dramatic change in path loss could necessitate a change in transmission power, and that in such an instance, a power headroom report would be necessary in a closed loop power control system for the base station to determine an appropriate transmission power. He would have also understood that efficient system design involves limiting the transmission of power headroom reporting to instances when it is needed. As a result, a skilled artisan looking to design an efficient system would have been motivated to consider and combine Zeira's and Otten's teaching about the use of path loss (and the change in path loss) in setting the transmit power as one criterion

in Fong's threshold-based parameters for determining when to send power headroom information.

127. Accordingly, one of ordinary skill in the art would have been motivated to combine Fong's system with the teachings of Zeira and Otten. That combination renders each of claims 3, 21, and 34 obvious because each of the claimed is either disclosed or would have been obvious to one of ordinary skill in the art based on that combination.

D. Ground 4: Claims 3, 21, and 34 Are Rendered Obvious Over Kwak In View of Zeira and Otten

128. It is my opinion that claims 3, 21, and 34 of the '676 patent are rendered obvious over Kwak (Ex. 1005) in view of Zeira (Ex. 1007) and Otten (Ex. 1006) for at least the reasons given below.

129. The limitations of claims 1, 19, and 33 are disclosed and rendered obvious by Fong, as described in Part V.B, above. Claims 3, 21, and 34 depend, respectively, from those claims and add that the "set of at least one triggering criterion comprises a triggering criterion such that an absolute difference between current and most recent path-loss measurements has reached a threshold of difference." Ex. 1001 at claims 3, 21; see also claim 34 ("set comprises a criterion such that an absolute difference between current and most recent path-loss measurements has reached a threshold of difference").

130. Kwak teaches embodiments that utilize more than one triggering criterion. For example, Kwak discloses fourth and fifth embodiments using both periodic and event-based criteria for triggering TPS transmission from a UE to a Node B. Ex. 1005 at [0092-0093, 0103-0104]; ***id.*** at Figs. 11-12. In the fourth embodiment, a TPS is transmitted every TPS period 1111, as well as any time a specified event occurs. ***Id.*** at [0093, 0096]. In the fifth embodiment, a TPS is transmitted only if both the criteria are met, i.e., that a specified event has occurred and the threshold TPS period 1210 has been reached. ***Id.*** at [0104, 0107]. For both embodiments, Kwak teaches an example event-based trigger using a threshold for the difference between the current TPS and the previous TPS. ***Id.*** at [0097, 0108-109]. Kwak also teaches, however, that other events that trigger TPS transmission could be defined. ***Id.*** at [0097, 0108-109].

131. Those of ordinary skill in the art understood that in open-loop power control, the UE measures the power of the forward link pilot channel to determine the UE's reverse channel transmit power setting. Ex. 1001 at 3:1-8; Ex. 1007 at 1:59-2:4. Path loss measured in the forward direction (i.e., path loss measured on the downlink from the Node B to the UE) is a general indicator of path loss in the reverse direction (i.e., path loss on the uplink from the UE to the Node B). Ex. 1001 at 4:2-7. That is because the same factors affecting path loss in the

downlink—antenna pattern, distance, and shadowing—affect path loss in the uplink.

132. Those of ordinary skill in the art also understood that in closed-loop power control, the UE's reverse channel transmit power setting is controlled by the Node B (or base station) based on the measured signal to interference ratio (SIR) of a communication received from the UE. Ex. 1001 at 3:1-8; Ex. 1007 at 2:5-14. As the '676 patent admits, the trend in the prior art was to use both an open loop power control mechanism at the terminal as well as options for the Node Bs to send closed loop power control correction commands to the terminal. Ex. 1001 at 3:15-18. As described above, Zeira teaches an example for combining closed loop and open loop control based on path loss measurements at the UE. Ex. 1007 at Fig. 4, 5:1-65. Other prior art systems were likewise directed combining aspects of closed loop and open loop control.

133. Those of ordinary skill in the art understood that the UE needs to continuously monitor for changes in the environment, such as highly dynamic environments that may affect path loss, as taught by Zeira and Otten. See, e.g., Ex. 1007 at 2:15-25, 2:50-58; Ex. 1006 at 4-7. But those of ordinary skill in the art also appreciated the need to balance transmission power for a particular UE with the need to maintain efficiency of the overall system. See, e.g., Ex. 1004 at [0028-29, 0033, 0024]; Ex. 1007 at 1:45-58, 2:15-25, 2:50-58; Ex. 1006 at 4-7. As Otten

teaches, in the context of path loss, one goal is to "provide a power control system to compensate for fading and interference without exceeding the minimum amount of power necessary to overcome such interference." Ex. 1006 at 5-6; ***see also id.*** at 30-31.

134. Otten further teaches using a given path loss measurement in conjunction with previous measurements to overcome sources of error associated with power adjustment based upon path loss alone:

> In one embodiment, the signal quality monitor includes a history compiler, situated at either the mobile unit or the nodal transceiver, that records and processes additional factors such as past signal quality measurements, position determination of the mobile unit, past measurements of received signal strength, past determinations of the output power of the received signal and other measurements well known to those in the art to provide a more comprehensive determination of actual signal quality. The difference is interpreted as a longer-term signal level deficiency.

Ex. 1006 at 26-27. One of ordinary skill in the art would understand Otten to teach and disclose monitoring for changes in RF environment and comparing those changes to previous path loss measurements to determine if a given change in path loss may require a change in transmission power.

135. As described above, Otten also teaches using changes in the forward link pilot channel received power level to indicate a change in the RF environment, which will affect both the forward and reverse channels. ***See id.*** at 28-29. Otten teaches that at each transceiver, the received signal is processed to derive a signal quality deficiency, "i.e., an estimate of the change in transmit power calculated as that which would be required to just achieve the specified minimum acceptable error rate under average conditions of fading and interference." ***Id.*** at 30-31. "If the error rate is higher than acceptable, the signal quality circuit output 222 will include a power increase command signal and if the error rate less than acceptable, a transmit power reduction will be output." ***Id.*** at 31.

136. It would have been obvious to one of ordinary skill in the art to combine Kwak's teaching of event-based triggering criterion for TPS transmission with Zeira's and Otten's teachings of the use of path loss measurements at the UE in open loop and closed loop power control systems to include in the set of triggering criterion a triggering criterion based on threshold of absolute difference between current and most recent path loss measurements. Creating such a criterion and implementing it the Kwak system would have been well within the capabilities of one of ordinary skill in the art, and choosing what criteria to use would have been a design choice by the system designer balancing the tradeoffs amongst various other criteria. Thus, it would have been obvious use a threshold of an

absolute difference in path loss as a one of a set of triggering criterion as required by claims 3, 21, and 34.

137. One of ordinary skill in the art would have been motivated to combine Kwak with the teachings of Zeira and Otten. Persons of ordinary skill in the art understood and appreciated the tradeoffs associated with sending power headroom reports more or less frequently. See, e.g., Ex. 1001 at 3:60-65. Kwak, in particular, teaches the use of periodic and event-based triggering criterion for determining when to send power control headroom reports. E.g.,Ex. 1005 at [0073-74, 0077, 0083, 0087, 0092-0093, 0103-0104]. Kwak also teaches that other events that trigger TPS transmission could be defined. E.g., Ex. 1005 at [0087, 0097, 0108-109]. At the same time, those of skill in the art also understood that power adjustments may be needed to compensate for path loss measured at the UE, and that power adjustments based on path loss in a closed loop control system could only be triggered by reporting power status information to the base station. E.g., Ex. 1001 at 3:1-14, 4:2-12; Ex. 1007 at 1:59-2:14. Thus, one of ordinary skill in the art considering Kwak's use of limiting parameters for sending power control headroom reports, as well as its express teaching to consider other criteria, would have been motivated to consider path loss measurements as one such criterion.

138. Indeed, the ordinarily skilled artisan would have understood the relationship between path loss and transmit power, as well as the relationship

between power headroom reporting, transmit power control, and system efficiency, and been motivated to consider both relationships in designing an efficient system. That is, the skilled artisan would have understood that a dramatic change in path loss could necessitate a change in transmission power, and that in such an instance, a power headroom report would be necessary in a closed loop power control system for the base station to determine an appropriate transmission power. He would have also understood that efficient system design involves limiting the transmission of power headroom reporting to instances when it is needed. As a result, a skilled artisan looking to design an efficient system would have been motivated to consider and combine Zeira's and Otten's teaching about the use of path loss (and the change in path loss) in setting the transmit power as one criterion in Kwak's threshold-based parameters for determining when to send power headroom information.

139. Accordingly, one of ordinary skill in the art would have been motivated to combine Kwak's system with the teachings of Zeira and Otten. That combination renders each of claims 3, 21, and 34 obvious because each of the claimed is either disclosed or would have been obvious to one of ordinary skill in the art based on that combination.

VI. REVISION OR SUPPLEMENTATION

140. In this report, I have presented my opinions regarding the invalidity of the claims of the ’676 Patent based on the information available to me. My opinions are subject to change in view of opinions provided by the patent owner or its expert, or any additional information that I may receive. I reserve the right to supplement my opinions accordingly.

Executed 26 July, 2016 at Danville, CA

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Tim A. Williams, Ph.D.

ATTACHMENT A

Tim Arthur Williams, Ph.D.
Curriculum Vitae

Dr. Williams has thirty-seven years of professional experience in wireless communications and telecom technology. He is an entrepreneur who has participated in the organization and operation of start up companies that brought wireless LAN, software VoIP PBX, and 2-way paging technology to the marketplace. Dr. Williams holds numerous patents in wireless and signal processing technology. He is an experienced litigation support consultant with experience in patent infringement matters. Dr. Williams is also a registered Patent Agent.

- Wireless LAN
- Cellular and PCS Standards
- Cellular Telephone Architecture
- Digital Signal Processing
- Telecommunications Technology
- VoIP Technology
- Computer Networking
- Wireless Networks & Protocols

Year	College or University	Degree
1991	University of Texas at Austin	MBA
1985	University of Texas at Austin	Ph.D. Dissertation: "Digital Signal Processing Techniques for Acoustic Log Data".
1982	University of Texas at Austin	MSEE, Dissertation: "Cepstral Processing of Speech Signals"
1976	Michigan Technological University	BSEE

Professional Experience

From: 2008
To: 2010
Organization: Expressume, Inc / Montage Inc. – Milwaukee, WI
Title: Board Member
Summary: This company sells software for human resource recruiting.

From: 2008
To: Present
Organization: Faculte, Inc. – San Jose, CA
Title: Board Member
Summary: This company provides SaaS (Software as a Service) web video based communication products.

From: 2008
To: 2010
Organization: BitRail Networks Inc. – Miami, FL
Title: Founder, Board Member
Summary: This company sells computer networking solutions.

From: 2008
To: Present
Organization: Calumet Venture Management – Madison, WI
Title: Member
Summary: This company provides seed capital and management expertise to small companies.

From: 2006
To: 2012
Organization: BEEcube Inc. – Fremont, CA
Title: Founder, Board Member
Summary: This company builds EDA solutions for the IC industry.

Tim Arthur Williams, Ph.D.
Curriculum Vitae

From: 2006
To: Present
Organization: Topaz Equity, LLC
Title: Founder, Board Member
Summary: This is a private equity investment company.

From: 2004
To: Present
Organization: DoceoTech Inc. – Danville, CA
Title: Founder, Chairman
Summary: This is a training company that provides training for engineers in Wireless, Networking, and Telephony technologies.

From: 2004
To: 2006
Organization: SiBEAM Inc. – Sunnyvale, CA
Title: Founder, Chief Executive Officer
Summary: This is a fabless semiconductor company that is developing high-speed wireless networking ICs. This company was sold to Silicon Image, Inc. in Apr 2011.

From: 2001
To: 2004
Organization: JetQue, Inc. – Danville, CA
Title: Founder, Chief Executive Officer
Summary: This company created messaging solutions for the mobile professional.

From: 1999
To: 2000
Organization: Atheros Communications, Palo Alto, CA
Title: Interim CEO, Advisory Board Member
Summary: This company builds wireless LAN ICs. Atheros became a public company in May 2004. (ATHR) This company was sold to QCOM in Jan 2011.

From: 1998
To: 2000
Organization: Picazo Communications – San Jose, CA
Title: Chief Technology Officer, Advisory Board Member

Summary: This company built software PBXs. The company was purchased by Intel.

From: 1996
To: Present
Organization: Beach Technologies, LLC – Danville, CA
Title: Chief Executive Officer
Summary: This is a consulting company that provides IP services.

From: 1991
To: 1998
Organization: Wireless Access, Inc. – Santa Clara, CA
Title: Co-Founder, Chief Technical Officer, Vice President of Engineering, Vice President of Business Strategy
Summary: This was a startup company focusing on the Narrow Band PCS equipment market. The company developed the over the air protocols, the subscriber equipment and the ICs to deploy 2-way paging services. The company was sold to Glenarye Electronics.

From: 1979
To: 1991
Organization: Motorola, Inc. – Austin, TX – Semiconductor Sector
Title: Sr. Engineer, Member Technical Staff, Sr. MTS
Summary: Business manager, project leader, and senior technical member of the teams which were responsible for product development of the following systems:

- ADPCM transcoder,
- ISDN U-reference point transceiver,
- CT-2 voice codec and channel modem,
- GSM voice codec and channel modem,
- TDMA voice codec and channel modem
- CDMA voice codec and channel modem, and
- Japanese Digital Cellular voice codec and channel modem.

From: 1976
To: 1979
Organization: Motorola Inc. - Chicago, IL - Communications Sector - Digital Voice Privacy Group

Tim Arthur Williams, Ph.D.
Curriculum Vitae

Title: Engineer

Summary: This group built the first commercial digitally encrypted two-way FM land mobile radio system.

Professional Certifications

- Patent Agent – U.S. Patent and Trademark Office #50,790 (Jan 2002)

Issued Patents

Patent	Date	Description
6,781,962	2004	Apparatus and Method for Stored Voice Message Control
6,600,481	2003	Data entry apparatus and method
6,088,457	2000	Method and apparatus for over the air programming a communication device
5,854,595	1998	Communications apparatus and method with a computer interchangeable integrated circuit card
5,557,642	1996	Direct conversion receiver for multiple protocols
5,428,638	1995	Method and apparatus for reducing power consumption in digital communications devices
5,345,406	1994	Bandpass sigma delta converter suitable for multiple protocols
5,101,344	1992	Data processor having split level control store
5,001,661	1991	Data processor with combined adaptive LMS and general multiplication functions
4,989,169	1991	Digital tone detector using a ratio of two demodulators of differing frequency
4,972,356	1990	Systolic IIR decimation filter
4,947,363	1990	Pipelined processor for implementing the least-mean-squares algorithm
4,965,762	1990	Mixed size radix recoded multiplier
4,843,585	1989	Pipelineable structure for efficient multiplication and accumulation operations
4,862,169	1989	Oversampled A/D converter using filtered, cascaded noise shaping modulators
4,876,542	1989	Multiple output oversampling A/D converter with each output containing data and noise
4,843,390	1989	Oversampled A/D converter having digital error correction
4,796,219	1989	Serial two's complement multiplier
4,737,925	1988	Method and apparatus for minimizing a memory table for use with nonlinear monotonic arithmetic functions

4,734,876	1988	Circuit for selecting one of a plurality of exponential values to a predetermined base to provide a maximum value
4,727,508	1988	Circuit for adding and/or subtracting numbers in logarithmic representation
4,722,067	1988	Method and apparatus for implementing modulo arithmetic calculations
4,682,302	1987	Logarithmic arithmetic logic unit
4,618,946	1986	Dual page memory system having storage elements which are selectively swapped between the pages
4,406,010	1983	Receiver for CVSD modulation with integral filtering
4,398,262	1983	Time multiplexed n-ordered digital filter

Case Name	Law Firm	Client	Status
Technology Properties Limited LLC ("TPL"); Phoenix Digital Solutions LLC ("PDS") and Patriot Scientific Corporation ("PTSC") v Samsung Electronics Co. ltd. And Samsung Electronics America Inc.	DLA Piper LLP	Samsung	Complete
MOSAID v Cisco	Mayer Brown LLP	MOSAID	Complete
Comerica v Maxim Integrated Products	McKenna Long & Aldridge LLP	Comerica	Ongoing
Intellectual Ventures I LLC and Intellectual Ventures II LLC v. AT&T Mobility LLC; AT&T Mobility II LLC; New Cingular Wireless Services Inc.; SBC Internet Services Inc.; Wayport Inc.; T-Mobile USA Inc.; Nextel Operations Inc.; Sprint Spectrum L.P.; United States Cellular Corporation; and Telephone and Data Systems Inc	Dechert LLP	Intellectual Ventures I LLC and Intellectual Ventures II LLC	Ongoing
Barnes & Noble v LSI	Quinn Emanuel LLP	Barnes & Noble	Complete

Case Name	Law Firm	Client	Status
Parkervision v Qualcomm	Cravath LLP	Qualcomm	Complete
Sprint Communications v Time Warner Cable et al.	Latham & Watkins LLP	Time Warner Cable	Ongoing
Golden Bridge v Motorola.	Kilpatrick Townsend LLP	Motorola	onhold
Kodak v HTC	Kecker & Van Nest LLP	HTC	Complete
Fujitsu v Belkin et al.	Covington LLP	Fujitsu	Complete

Case Name	Law Firm	Client	Status
VirneTX v Avaya	Fish and Richardson LLP	Avaya	Complete
Interdigital v Huawei et al.	Covington LLP;Fish and Richardson LLP; Brinks Hofer Gilson & Lione LLP; Alston & Bird LLP	Huawei; LG; ZTE; Nokia	Complete
SPH America v Acer Inc. et al	Nixon Peabody; K&L Gates; Altson and Bird; Greenberg Traurig; Spotts Fain; Winston & Strawn; Goodwin Proctor	Sierra Wireless; Novatel; Nokia; Hewlett Packard; UT Starcom; Motorola Solutions; Motorola Mobility.	Complete
MMI v Apple Inc.	Proskauer LLP	MMI	Complete
Motorola v Microsoft Inc.	Ropes and Grey LLP	Motorola	Complete

Case Name	Law Firm	Client	Status
Motorola v Apple Inc.	Quinn Emanuel LLP	Motorola	Complete
MOSAID v Cisco Inc.	Hogan Lovells LLP	MOSAID	Complete
HTC v Apple Inc.	Finnegan Henderson LLP Keker & Van Nest LLP	HTC	Complete
Samsung v Apple Inc.	Quinn Emanuel LLP	Samsung	Complete
Broadcom v Emulex	Gibson Dunn LLP	Emulex	Settled

Case Name	Law Firm	Client	Status
WiAV v Motorola	Howrey LLP	Motorola	Settled
WiAV v Sony	Quinn Emanuel	Sony	Settled
Minerva Inc. v Motorola Inc. et al.	Howrey LLP	Research in Motion	Settled
Telecommunications Systems Inc. v Sybase 365 Inc.	McDermott Will & Emery LLP	Sybase	Settled
AT&T v Airbiquity	Baker Botts LLP	AT&T	Settled

Case Name	Law Firm	Client	Status
SPH v Nokia	Foley and Lardner LLP	Nokia	Complete
ESN v Cisco	Quinn Emanuel LLP	Cisco	Settled
Data Treasury Corp. v. Wells Fargo. et al.	Baker & McKenzie LLP and Kilpatrick Stockton LLP	Wells Fargo and Wachovia.	Settled
Saxon Innovations LLC. v. Nokia Corp. et al.	Covington & Burling; Cooley; Howrey; DLA Piper	Samsung; Nintento; RIM; Palm	Settled
eBay Inc. v. IDT Corp. et al.	Irell & Manella LLP	eBay.	Settled

Case Name	Law Firm	Client	Status
SPH America LLC v. Kyocera Wireless Corp. et al.	Foley & Lardner LLP	Kyocera.	Settled
Paradox Ltd. v. ADT Ltd.	Banner & Witcoff	Paradox	Complete
Freedom Wireless Inc. v. Cricket Communications Inc et al.	Latham & Watkins LLP	Cricket Comm.	Settled
in re Katz Interactive Call Processing	Jones Day LLP	Citizens Communications	Settled
Intermec Tech. V. Palm Inc.	Heller Ehrman LLP and Covington & Burling LLP	Palm	Complete

Case Name	Law Firm	Client	Status
Verizon Corp. v. Cox Inc.	Kilpatrick Stockton LLP	Cox	Complete
Motorola Inc. v. Research in Motion Inc.	Ropes & Grey LLP	Motorola	Complete
Intel Corp. v. CSIRO Inc.	Keker & Van Nest LLP	Intel	Complete
Intel Corp. v. Wi-LAN Inc.	Kirkland and Ellis LLP	Intel	Complete
C2 Comm. Tech Inc. v. AT&T Inc.	Sidley Austin LLP	AT&T	Settled

Case Name	Law Firm	Client	Status
Commil USA LLC v. Cisco Systems Inc.	Simpson Thacher & Bartlett LLP	Cisco	Complete
in re Katz Patents	Howrey	General Electric	Settled
3Com Inc. v. D-Link/ Realtek Inc.	Simpson Thacher & Bartlett LLP	3Com	Complete
in re Katz Patents	Jones Day LLP	Experian	Settled
Qualcomm Inc. v. Broadcom Inc.	Cooley Godward Kronish LLP	Qualcomm	Complete

Case Name	Law Firm	Client	Status
Qualcomm Inc. v. Nokia Inc.	DLA Piper	Qualcomm	Complete
Microsoft Inc. v. Alcatel Inc.	Fish and Richardson	Microsoft	Settled
Foundry Networks v. Alcatel Inc.	Howrey	Foundry Networks	Settled
Ericsson Inc v. Samsung Inc.	McKool Smith	Ericsson	Settled
Qualcomm Inc v. Broadcom Inc.	Heller Ehrman White & McAuliffe	Qualcomm	Settled

Case Name	Law Firm	Client	Status
STS Networks v. Witness Systems	Fish and Richardson	Witness Systems	Complete
Foundry Networks v. Lucent Technologies Inc.	Howrey	Foundry Networks	Settled
GlobespanVirata v. Texas Instruments	Heller Ehrman White & McAuliffe	Texas Instruments; Stanford University	Complete
Agere Systems v. Broadcom Inc.	Weil Gotshal & Manges	Broadcom	Settled
Proxim v. 3Com	Morgan Miller and Blair	3Com.	Settled

Case Name	Law Firm	Client	Status
Broadcom Inc. v Qualcomm Inc.	Cooley Godward Kronish LLP	Qualcomm	Complete
Broadcom Inc. v Qualcomm Inc.	Cravath Swaine & Moore	Qualcomm	Complete
Broadcom Inc. v Qualcomm Inc.	Heller Ehrman White & McAuliffe	Qualcomm	Settled
Ericsson v Samsung	Fish and Richardson LLP	Samsung	Complete
Digitude v Motorola	Kilpatrick Townsend LLP	Motorola	Complete

Case Name	Law Firm	Client	Status
HTC v Apple Inc.	Finnegan Henderson LLP	HTC	Complete
Tekelec v Performance Technologies Inc.	Fish and Richardson LLP	Performance Technologies; Inc.	Settled
Adaptix v Motorola Mobility LLC et al.	Winston & Strawn LLP	Motorola Mobility	Ongoing
Cassidian Communications v. microData GIS Inc.; microData LLC; and TeleCommunications Systems Inc.	Bunsow De Mory Smith & Allison LLP	Cassidian Communications	Complete
Commonwealth Scientific and Industrial Research Organisation v. MediaTek Inc. et al.	OêMelveny & Myers LLP	Samsung Electronics Co.; Ltd.; Samsung Semiconductor Inc.; and Samsung Telecommunications America; LLC	onhold

Case Name	Law Firm	Client	Status
InterDigital Technology Corp.IPR Licensing Inc. and InterDigital Holdings Inc	Ropes & Gray LLP	Samsung Electronics Co.; LTD.; Samsung Electronics America; Inc.; and Samsung Telecommunications America; LLC	Ongoing
InterDigital Technology Corp.IPR Licensing Inc. and InterDigital Holdings Inc	Alston & Bird LLP	Nokia Corporation and Nokia Inc	Settled
InterDigital Technology Corp.IPR Licensing Inc. and InterDigital Holdings Inc	Brinks Hofer Gilson & Lione	ZTE Corporation and ZTE (USA) Inc.	Ongoing
InterDigital Technology Corp.IPR Licensing Inc. and InterDigital Holdings Inc	Covington & Burling LLP	Huawei	Ongoing
Intellectual Ventures I LLC and Intellectual Ventures II LLC v Canon Inc. Canon U.S.A. Inc. and Canon Solutions America Inc.	Tensegrity Law Group LLP	Intellectual Ventures I LLC and Intellectual Ventures II LLC	Ongoing

Case Name	Law Firm	Client	Status
Intellectual Ventures I LLC and Intellectual Ventures II LLC v Ricoh Company Ltd. Ricoh Americas Corporation and Ricoh Electronics Inc	Tensegrity Law Group LLP	Intellectual Ventures I LLC and Intellectual Ventures II LLC	Ongoing
SimpleAir Inc. v. Microsoft Corporation et al.	Kilpatrick Townsend & Stockton LLP	Google Inc.	Complete
SimpleAir Inc. v. Microsoft Corp. et al.	Kirkland & Ellis LLP	Samsung Electronics Co.; Ltd.; Samsung Electronics America; Inc.; and Samsung Telecommunications America LLC	Complete
WIAV Solutions v. ZTE Corporation. et at.	Goodwin Procter LLP	ZTE Corporation and ZTE (USA)	Complete
AT&T v. Intrado	Sidley Austin LLP	AT&T Mobility LLC (f/k/a Cingular Wireless LLC) (_AT&Tî);	Complete

Case Name	Law Firm	Client	Status
Intellectual Ventures v PNC Bank, Capital One, First National Bank of Omaha, JP Morgan Chase, Fifth Third Bank, Bank of America, BBVA Compass Bank, Commerce Bank, Suntrust, and M&T	Feinberg Day Alberti & Thompson LLP	Intellectual Ventures	Ongoing
Intellectual Ventures v PNC Bank, Capital One, First National Bank of Omaha, JP Morgan Chase, Fifth Third Bank, Bank of America, BBVA Compass Bank, Commerce Bank, Suntrust, and M&T	Feinberg Day Alberti & Thompson LLP	Intellectual Ventures	Ongoing
Adaptix v Motorola Mobility LLC et al.	Winston & Strawn LLP	Motorola Mobility	Ongoing
AIP Acquisition LLC v. Cablevision Systems Corporation, et al.	Gibson Dunn		Complete
Monec Holding AG v. Motorola Mobility LLC, et al.,	Kilpatrick Townsend & Stockton	Motorola Mobility LLC	Ongoing

Case Name	Law Firm	Client	Status
Monec Holding AG v. Motorola Mobility LLC, et al.,	Cooley LLP	HTC Corporation	Ongoing
Monec Holding AG v. Motorola Mobility LLC, et al.,	Cooley LLP	Exedea, Inc	Ongoing
Monec Holding AG v. Motorola Mobility LLC, et al.,	Fish & Richardson P.C.	Samsung Electronics America, Inc. and Samsung Electronics, Inc.	Ongoing
Sasken Communication Technologies Limited v. Spreadtrum Communications, Inc. and Spreadtrum Communications USA Inc	Covington & Burling LLP	Spreadtrum	Ongoing
Cellport v. ZTE et al.	Sheppard Mullin Richter & Hampton LLP	ZTE Corporation and ZTE (USA)	

Case Name	Law Firm	Client	Status
Cellport v. ZTE et al.	Dickstein Shapiro LLP, Lathrop & Gage, LLP	LG Electronics, Inc., et al	
Cellport v. ZTE et al.	FOX ROTHSCHILD LLP, KING & SPALDING LLP	Nokia Corp., et al.	
Cellport v. ZTE et al.	GREENBERG TRAURIG, LLP	Samsung Electronics Co., Ltd., et al	
Cellport v. ZTE et al.	FINNEGAN, HENDERSON, LLP and HOLLAND & HART LLP	HTC Corp., et al	
Cellport v. ZTE et al.	BAKER & McKENZIE LLP	Pantech Co. Ltd., et al	

Case Type	Firm	Case Name	Client
Patent Infringement wi	Morgan Miller and Blair	Proxim v. 3Com	3Com.
Patent Infringement Ne	Simpson Thacher & Bartlett LLP	3Com Inc. v. D-Link/ Realtek Inc.	3Com
Patent Infringement W	Weil Gotshal & Manges	Agere Systems v. Broadcom Inc.	Broadcom
Patent Infringement Di	Heller Ehrman White & McAuliffe	GlobespanVirata v. Texas Instruments	Texas Instruments; Stanford University
Patent Infringement Ce	McKool Smith	Ericsson Inc v. Samsung Inc.	Ericsson
Patent Infringement PE	Howrey	Foundry Networks v. Alcatel Inc.	Foundry Networks
Patent Infringement PE	Howrey	Foundry Networks v. Lucent Technologies Inc.	Foundry Networks
Patent Infringement W	Kirkland and Ellis LLP	Intel Corp. v. Wi-LAN Inc.	Intel
Patent Infringement Vo	Fish and Richardson	STS Networks v. Witness Systems	Witness Systems
Patent Infringement Te	Sidley Austin LLP	C2 Comm. Tech Inc. v. AT&T Inc.	AT&T
Patent Infringement Ne	Simpson Thacher & Bartlett LLP	Commil USA LLC v. Cisco Systems Inc.	Cisco
Patent Infringement PE	Fish and Richardson	Microsoft Inc. v. Alcatel Inc.	Microsoft
Patent Infringement an	Heller Ehrman White & McAuliffe	Qualcomm Inc v. Broadcom Inc.	Qualcomm
Patent Infringement Te	Jones Day LLP	in re Katz Patents	Experian
Patent Infringement Te	Howrey	in re Katz Patents	General Electric
Patent Infringement W	Heller Ehrman LLP and Covington & Burling LLP	Intermec Tech. V. Palm Inc.	Palm
Patent Infringement Ce	Cooley Godward Kronish LLP	Qualcomm Inc. v. Broadcom Inc.	Qualcomm
Patent Infringement Ce	DLA Piper	Qualcomm Inc. v. Nokia Inc.	Qualcomm
Patent Infringement	Howrey LLP	Minerva Inc. v Motorola Inc. et al.	Research in Motion
Patent Infringement	Covington & Burling; Cooley; Howrey; DLA Piper	Saxon Innovations LLC. v. Nokia Corp. et al.	Samsung; Nintento; RIM; Palm
Patent Infringement	Baker Botts LLP	AT&T v Airbiquity	AT&T
Patent Infringement	Quinn Emanuel LLP	ESN v Cisco	Cisco
Patent Infringement Te	Jones Day LLP	in re Katz Interactive Call Processing	Citizens Communications
Patent Infringement Vo	Kilpatrick Stockton LLP	Verizon Corp. v. Cox Inc.	Cox
Patent Infringement	Latham & Watkins LLP	Freedom Wireless Inc. v. Cricket Communications Inc et al.	Cricket Comm.
Patent Infringement	Irell & Manella LLP	eBay Inc. v. IDT Corp. et al.	eBay.
Patent Infringement	Foley & Lardner LLP	SPH America LLC v. Kyocera Wireless Corp. et al.	Kyocera.
Patent Infringement W	Ropes & Grey LLP	Motorola Inc. v. Research in Motion Inc.	Motorola
Patent Infringement	Banner & Witcoff	Paradox Ltd. v. ADT Ltd.	Paradox
Patent Infringement	Gibson Dunn LLP	Broadcom v Emulex	Emulex
Patent Infringement W	Keker & Van Nest LLP	Intel Corp. v. CSIRO Inc.	Intel
Patent Infringement	Foley and Lardner LLP	SPH v Nokia	Nokia
Patent Infringement	Fish and Richardson LLP	Tekelec v Performance Technologies Inc.	Performance Technologies; Inc.
Patent Infringement	McDermott Will & Emery LLP	Telecommunications Systems Inc. v Sybase 365 Inc.	Sybase
Patent Infringement	Kecker & Van Nest LLP	Kodak v HTC	HTC
Patent Infringement	Howrey LLP	WiAV v Motorola	Motorola
Patent Infringement	Quinn Emanuel	WiAV v Sony	Sony
Patent Infringement	Covington LLP	Fujitsu v Belkin et al.	Fujitsu
Patent Infringement	Finnegan Henderson LLP Keker & Van Nest LLP	HTC v Apple Inc.	HTC
Patent Infringement	Hogan Lovells LLP	MOSAID v Cisco Inc.	MOSAID
Patent Infringement	Quinn Emanuel LLP	Motorola v Apple Inc.	Motorola
Patent Infringement	Finnegan Henderson LLP	HTC v Apple Inc.	HTC
Patent Infringement	Proskauer LLP	MMI v Apple Inc.	MMI
Patent Infringement	Ropes and Grey LLP	Motorola v Microsoft Inc.	Motorola
Patent Infringement	Quinn Emanuel LLP	Samsung v Apple Inc.	Samsung
Patent Infringement	Fish and Richardson LLP	VirneTX v Avaya	Avaya
Patent Infringement an	Heller Ehrman White & McAuliffe	Broadcom Inc. v Qualcomm Inc.	Qualcomm
Patent Infringement	Baker & McKenzie LLP and Kilpatrick Stockton LLP	Data Treasury Corp. v. Wells Fargo. et al.	Wells Fargo and Wachovia.
Patent Infringement	Cravath Swaine & Moore	Broadcom Inc. v Qualcomm Inc.	Qualcomm
Patent Infringement	Cooley Godward Kronish LLP	Broadcom Inc. v Qualcomm Inc.	Qualcomm
Arbitration	Sidley Austin LLP	AT&T v. Intrado	AT&T Mobility LLC (f/k/a Cingular Wireless LLC) (_AT&Tî);
Patent Infringement	Nixon Peabody; K&L Gates; Altson and Bird; Greenbe	SPH America v Acer Inc. et al	Sierra Wireless; Novatel; Nokia; Hewlett Packard; UT Starcom; Motorola Solutions; Motorola Mobility.
Patent Interference	Foley and Lardner LLP	Application Serial No 10/304,121 and U.S. Patent No. 7,084,529, Patent Interference No	EnOcean GMBH
Patent Infringement	Mayer Brown LLP	MOSAID v Cisco	MOSAID
Patent Infringement	Kilpatrick Townsend LLP	Golden Bridge v Motorola.	Motorola
Patent Infringement	Quinn Emanuel LLP	Barnes & Noble v LSI	Barnes & Noble
Patent Infringement	Covington LLP;Fish and Richardson LLP; Brinks Hofer	Interdigital v Huawei et al.	Huawei; LG; ZTE; Nokia
Patent Infringement	Cravath LLP	Parkervision v Qualcomm	Qualcomm
Patent Infringement	Latham & Watkins LLP	Sprint Communications v Time Warner Cable et al.	Time Warner Cable
Patent Infringement	Kilpatrick Townsend LLP	Digitude v Motorola	Motorola
Patent Infringement	Dechert LLP	Intellectual Ventures I LLC and Intellectual Ventures II LLC v. AT&T Mobility LLC; AT&T M	Intellectual Ventures I LLC and Intellectual Ventures II LLC
Patent Infringement	McKenna Long & Aldridge LLP	Comerica v Maxim Integrated Products	Comerica

Petitioner's Exhibit 1003

Patent Infringement	DLA Piper LLP	Technology Properties Limited LLC ("TPL");Phoenix Digital Solutions LLC ("PDS") and Pat	Samsung
Patent Infringement	Goodwin Procter LLP	WIAV Solutions v. ZTE Corporation. et at.	ZTE Corporation and ZTE (USA)
Patent Infringement	Fish and Richardson LLP	Ericsson v Samsung	Samsung
Patent Infringement	Kirkland & Ellis LLP	SimpleAir Inc. v. Microsoft Corp. et al.	Samsung Electronics Co.; Ltd.; Samsung Electronics America; Inc.; and Samsung Telecommunications America LLC
Patent Infringement	Winston & Strawn LLP	Adaptix v Motorola Mobility LLC et al.	Motorola Mobility
Patent Infringement	Winston & Strawn LLP	Adaptix v Motorola Mobility LLC et al.	Motorola Mobility
Patent Infringement	Bunsow De Mory Smith & Allison LLP	Cassidian Communications v. microData GIS Inc.; microData LLC; and TeleCommunicati	Cassidian Communications
Patent Infringement	Kilpatrick Townsend & Stockton LLP	SimpleAir Inc. v. Microsoft Corporation et al.	Google Inc.
Patent Infringement	Ropes & Gray LLP	InterDigital Technology Corp.IPR Licensing Inc. and InterDigital Holdings Inc	Samsung Electronics Co.; LTD.; Samsung Electronics America; Inc.; and Samsung Telecommunications America; LLC
Patent Infringement	Covington & Burling LLP	InterDigital Technology Corp.IPR Licensing Inc. and InterDigital Holdings Inc	Huawei
Patent Infringement	Covington & Burling LLP	InterDigital Technology Corp.IPR Licensing Inc. and InterDigital Holdings Inc	Huawei
Patent Infringement	Brinks Hofer Gilson & Lione	InterDigital Technology Corp.IPR Licensing Inc. and InterDigital Holdings Inc	ZTE Corporation and ZTE (USA) Inc.
Patent Infringement	Alston & Bird LLP	InterDigital Technology Corp.IPR Licensing Inc. and InterDigital Holdings Inc	Nokia Corporation and Nokia Inc
Patent Infringement	Tensegrity Law Group LLP	Intellectual Ventures I LLC and Intellectual Ventures II LLC v Canon Inc. Canon U.S.A. Inc	Intellectual Ventures I LLC and Intellectual Ventures II LLC
Patent Infringement	Tensegrity Law Group LLP	Intellectual Ventures I LLC and Intellectual Ventures II LLC v Ricoh Company Ltd. Ricoh A	Intellectual Ventures I LLC and Intellectual Ventures II LLC
Patent Infringement	O Melveny & Myers LLP	Commonwealth Scientific and Industrial Research Organisation v. MediaTek Inc. et al.	Samsung Electronics Co.; Ltd.; Samsung Semiconductor Inc.; and Samsung Telecommunications America; LLC
Patent Infringement	Feinberg Day Alberti & Thompson LLP	Intellectual Ventures v PNC Bank, Capital One, First National Bank of Omaha, JP Morgar	Intellectual Ventures
Patent Infringement	Feinberg Day Alberti & Thompson LLP	Intellectual Ventures v PNC Bank, Capital One, First National Bank of Omaha, JP Morgar	Intellectual Ventures
Patent Infringement	Gibson Dunn	AIP Acquisition LLC v. Cablevision Systems Corporation, et al.	CSC Holdings LLC
Patent Infringement	Cooley LLP	Monec Holding AG v. Motorola Mobility LLC, et al.,	Exedea, Inc
Patent Infringement	Cooley LLP	Monec Holding AG v. Motorola Mobility LLC, et al.,	HTC Corporation
Patent Infringement	Kilpatrick Townsend & Stockton	Monec Holding AG v. Motorola Mobility LLC, et al.,	Motorola Mobility LLC
Patent Infringement	Fish & Richardson P.C.	Monec Holding AG v. Motorola Mobility LLC, et al.,	Samsung Electronics America, Inc. and Samsung Electronics, Inc.
Arbitration	Covington & Burling LLP	Sasken Communication Technologies Limited v. Spreadtrum Communications, Inc. and :	Spreadtrum
Patent Infringement	FINNEGAN, HENDERSON,LLP and HOLLAND & HART	Cellport v. ZTE et al.	HTC Corp., et al
Patent Infringement	Dickstein Shapiro LLP, Lathrop & Gage, LLP	Cellport v. ZTE et al.	LG Electronics, Inc., et al
Patent Infringement	FOX ROTHSCHILD LLP, KING & SPALDING LLP	Cellport v. ZTE et al.	Nokia Corp., et al.
Patent Infringement	BAKER & McKENZIE LLP	Cellport v. ZTE et al.	Pantech Co. Ltd., et al
Patent Infringement	GREENBERG TRAURIG, LLP	Cellport v. ZTE et al.	Samsung Electronics Co., Ltd., et al
Patent Infringement	Sheppard Mullin Richter & Hampton LLP	Cellport v. ZTE et al.	ZTE Corporation and ZTE (USA)
Patent Infringement	Ropes & Gray LLP	Broadcom Corp. v. NXP Semiconductors USA, Inc.	Broadcom
Patent Infringement	Quin Emanuel	GENBAND US LLC v. Metaswitch Networks Ltd., et. al.	Metaswitch Networks Ltd.
Patent Infringement	O'Melveny & Myers LLP	Concinnitas, LLC and George Hindman v. Samsung Telecommunications America, LLC, e	Samsung Electronics America, Inc. and Samsung Telecommunications America, LLC
IPR	Hill, Kertscher & Wharton, LLP	Regarding the U.S. Patent No. 8,400,926 B2	HTC Corporation
IPR	Hill, Kertscher & Wharton, LLP	Regarding the U.S. Patent No. 8,134,600, 8,477,197, 8581,991	HTC Corporation
IPR	Morgan, Lewis & Bockius_LLP	Regarding the U.S.Patent No. 6,819,923	NEC Casio Mobile Communications Ltd. and NEC Corp of America
IPR	Everett Upshaw, PLLC	Regarding the U.S.Patent No. 7,215,962	ZTE Corporation and ZTE (USA)
Patent Infringement	Fenwick & West LLP	Cellular Communications Equipment LLC v. Amazon.com, Inc. et al	Amazon Inc.
Patent Infringement	Pillsbury Winthrop Shaw Pittman	Cellular Communications Equipment LLC v. HTC Corporation et al	HTC Corporation
IPR	H.C. Park & Associates, PLC	Regarding the U.S.Patent No. 7,218,923	Pantech Co. Ltd., et al
Patent Infringement	Pillsbury Winthrop Shaw Pittman	SPH America LLC v. ZTE Corp et. al.	ZTE Corporation and ZTE (USA) Inc.
Patent Infringement	Pillsbury Winthrop Shaw Pittman	Novatel Wireless, Inc. v. ZTE Corp. et. al.	ZTE Corporation and ZTE (USA) Inc.
Patent Analysis	Qualcomm	Analysis of Qualcomm portfolio	Qualcomm
IPR	Pillsbury Winthrop Shaw Pittman	Regarding Vringo patents	ZTE Corporation and ZTE (USA) Inc.
Patent Infringement	Finnegan, Henderson, Farabow,Garrett & Dunner, L.L	OpenTV Inc. et. al. v. Apple, Inc.	OpenTV, Inc. and Nagravision, SA of the Kudelski Group
IPR	Foley and Lardner LLP	Regarding the U.S. Patent No. 8,532,231, 8,565,346	Huawei Technologies Co., Ltd., Futurewei Technologies, Inc. and Huawei Device USA,
Patent Infringement	Desmarais LLP	Intellectual Ventures I LLC and Intellectual Ventures 11 LLC v. Nikon Corp., et al	Intellectual Ventures I LLC and Intellectual Ventures II LLC
Patent Infringement	Cooley LLP	ParkerVision, Inc. v Qualcomm Incorporated, et al	Qualcomm
Patent Infringement	DLA Piper LLP	Technology Properties Ltd LLC et al. v. Samsung Electronics Co., Ltd	Samsung Electronics Co., Ltd.
Patent Infringement	Paul Hastings	Summit 6 LLC v. HTC Corp.	HTC Corp and HTC America
Patent Infringement	Kolpatrick Townsend & Stockton LLP	Summit 6 LLC v. Motorola	Google/Motorola
Patent Infringement	Quin Emanuel	Cellular Communications Equipment LLC v. Samsung Electronics Co.Ltd et al	Samsung Electronics Co., Ltd., Samsung Electronics America Inc., and Samsung Telecommunications America LLC
IPR	Sterne, Kessler, Goldstein&Fox PLLC	Int'l Bus. Machines Corp. v IV	IV
Patent Infringement	Novak, Druce Connolly Bove + Quigg LLP	Sonus Networks, Inc. v Inventergy, Inc. and Inventergy Global, Inc	Inventergy, Inc. and Invetergy Global, Inc
Patent Infringement	Novak, Druce Connolly Bove + Quigg LLP	Sonus Networks, Inc. v Inventergy, Inc. and Inventergy Global, Inc	Inventergy, Inc. and Invetergy Global, Inc
Patent Infringement	Novak, Druce Connolly Bove + Quigg LLP	Sonus Networks, Inc. v Inventergy, Inc. and Inventergy Global, Inc	Inventergy, Inc. and Invetergy Global, Inc
Arbitration	Mayer Brown LLP	Nokia Technologies Ltd and LG Electronics, Inc.	LG Electronics, Inc.
IPR	Sterne, Kessler, Goldstein&Fox PLLC	LM Ericsson v IV	Intellectual Ventures I LLC and Intellectual Ventures II LLC
IPR	Sterne, Kessler, Goldstein&Fox PLLC	Old Republic Group Inc. v IV	Intellectual Ventures I LLC and Intellectual Ventures II LLC
IPR	Sterne, Kessler, Goldstein&Fox PLLC	LM Ericsson v IV	Intellectual Ventures I LLC and Intellectual Ventures II LLC

Petitioner's Exhibit 1003

ATTACHMENT B

<u>**ATTACHMENT B TO EXHIBIT 1003**</u>

Invalidity Of Claims 1, 19, and 33 of U.S. Patent No. 8,457,676
In View Of U.S. Patent Application Pub. No. 2004/0223455 to Fong et al. (Ex. 1004)

Challenged Claim of the '676	Disclosure in Fong (Ex. 1004)
1. A method comprising:	
[1a] determining that a set of at east one triggering criterion is met; and	As further shown in FIG. 1, each mobile station **16** includes a processor **42** and a storage **44**. The processor **42** provides a processing core on which one or more software modules are executable to enable the mobile station to perform various tasks. Also, the mobile station **16** includes buffers **46** for temporarily holding data that are to be communicated over the reverse wireless link to the base station **19**. The base station **19** also includes a processor **48** and a storage **50** (or multiple processors and storages). The scheduler **40** can be a software module that is executable on the processor **48**. Ex. 1004 at [0031] FIG. 2 is a message flow diagram of a procedure according to one embodiment for communicating reverse request messages containing buffer status and data rate information over a reverse wireless link. Initially, call setup messaging is exchanged (at **102**) between the base station **19** and the mobile station **16**. . . . The base station sends (at **104**) various messages to the mobile station, with such message(s) containing trigger parameters that are used by the mobile station to trigger the transmission of a reverse request message on R-REQCH." *Id.* at [0043] "Examples of trigger parameters that are sent by the base station to the

Challenged Claim of the '676	Disclosure in Fong (Ex. 1004)
	mobile station include REV_PDCH_REQCH_TRIGGERs[p] (where i represents a particular service instance), REV_PDCH_POWER_HEADROOM_INCREASEs, REV_PDCH_POWER_HEADROOM_DECREASEs, REV_PDCH_HEADROOM_DURATIONs, and REV_PDCH_MAX_POWER_UPDATE_DURATIONs. The REV_PDCH_REQCH_TRIGGERs[i] parameter contains at least the following fields: MIN_DURATION, to indicate a minimum duration at which a mobile station should send a reverse request message to the base station; and USE_POWER_REPORTS, to indicate if a change in power headroom by a specified amount at the mobile station is to be used to trigger the transmission of a reverse request message for the particular service instance i. The REV_PDCH_REQCH_TRIGGERs[i].MIN_DURATION field is set at a value to prevent the mobile station from transmitting reverse request messages too frequently. The REV_PDCH_POWER_HEADROOM_INCREASEs and REV_PDCH_POWER_HEADROOM_DECREASEs parameters are used to define respectively the amount of power headroom increase and decrease at the mobile station that will trigger the transmission of a reverse request message. Power headroom refers to the available transmit power for transmitting data on a reverse traffic channel, including the reverse packet data channel (R-PDCH). The REV_PDCH_HEADROOM_DURATIONs parameter indicates another duration, different from REV_PDCH_REQCH_TRIGGERs[i].MIN_DURATION, for indicating whether a reverse request message should be transmitted in response to detecting that a sufficient change in power headroom has triggered

Challenged Claim of the '676	Disclosure in Fong (Ex. 1004)
	transmission of a reverse request message. The REV_PDCH_HEADROOM_DURATIONs is set at a value to prevent the mobile station from transmitting reverse request messages too frequently when triggered by power headroom changes. The REV_PDCH_MAX_POWER_UPDATE_DURATIONs parameter is used to indicate a maximum duration after with the mobile station must transmit a reverse request message if other criterion(ia) is(are) satisfied. This duration is provided to specify a maximum period between transmissions of reverse request messages by a mobile station. In one specific embodiment, this periodic transmission of reverse request messages after every REV_PDCH_MAX_POWER_UPDATE_DURATIONs can be used for the purpose of reverse link outer-loop power control based on frame quality of the reverse request message. The parameters listed above are provided for purposes of example, as other trigger parameters can be used in other embodiments. Next, the mobile station detects (at 106) whether a trigger has occurred to send a reverse request message. If a trigger has occurred, based on the trigger parameters sent by the base station to the mobile station, the mobile station sends (at 108) a reverse request message on R-REQCH. Next, the base station performs (at 110) scheduling based on information in the reverse request message." *Id.* at [0044]-[0050] There are at least three triggers for sending a reverse request message. A first trigger is a buffer update trigger. This trigger involves determining whether the state of the parameter field REV_PDCH_REQCH_TRIGGERs[i].USE_BUFFER_REPORTS is true, and whether a current system time (the time provided by the clock of the

Challenged Claim of the ’676	Disclosure in Fong (Ex. 1004)
	mobile station) exceeds a time at which a reverse request message was last transmitted for the service instance i by the predetermined time duration specified by REV_PDCH_REQCH_TRIGGER$_s$[i].MIN_DURATION. The current system time is saved in a parameter saved_sys_time. The time that a reverse request message was last sent for the service instance i is stored in a parameter last_time_reported[i]. Thus, for a particular service instance i, if REV_PDCH_REQCH_TRIGGER$_s$[i].USE_BUFFER_REPORTS is true, and if saved_sys_time is equal to or greater than (last_time_reported[i]+REV_PDCH_REQCH_TRIGGER$_s$[i].MIN_DURATION), then that is a trigger (referred to as trigger **1**) to send a reverse request message for the purpose of updating the buffer status to the base station. *Id.* at [0052] Another trigger (referred to as trigger **2**) that causes transmission of the reverse request message involves determining whether a maximum duration has elapsed during which a reverse request message has not been sent. For the scheduler **40** in the base station to accurately perform scheduling to properly arrange loading on R-PDCH, the scheduler **40** needs accurate buffer status and power headroom (data rate) information. Waiting too long between reverse request messages may result in inaccurate information being used by the base station. Thus, trigger **2** relates to ensuring that the mobile station does not wait too long between transmission of the reverse request messages to the base station. According to trigger **2**, if saved_sys_time (the current mobile station system time) minus last_req_sent (the time at which a reverse request message was last sent for any service instance) is greater than or equal to REV_PDCH_MAX_POWER_UPDATE_DURATION$_s$, and buffer_status[N] is greater than zero, then a trigger to send the reverse

Challenged Claim of the '676	Disclosure in Fong (Ex. 1004)
	request message has occurred. *Id.* at [0059] A third trigger (trigger 3) is a power change trigger. This trigger is based on a determination of whether the current power headroom (current_power_headroom) differs from a prior power headroom (last_power_headroom) by greater than a predetermined amount, as indicated by the REV_PDCH_POWER_HEADROOM_INCREASEs or REV_PDCH_POWER_HEADROOM_DECREASEs parameter. If there is a sufficient change in power headroom, and if the current system time (saved_sys_time) exceeds the time at which a reverse request message was last sent (last_req_sent) by greater than or equal to REV_PDCH_HEADROOM_DURATIONs, and if buffer_status[i] is greater than zero (which indicates there is data in the buffer to send over the reverse wireless link for service instance i), then trigger 3 has occurred. More specifically, trigger 3 is true if all three of the following are true: (1) (current_power_headroom − lastpower_headroom) > REV_PDCH_POWER_HEADROOM_INCREASEs, or (current_power_headroom − lastpower_headroom) < −REV_PDCH_POWER_HEADROOM_DECREASEs; (2) saved_sys_time ≧(REV_ last_req_sent); and (3) buffer_status[i] > 0. *Id.* at [0062].

Challenged Claim of the '676	Disclosure in Fong (Ex. 1004)
[1b] providing a power control headroom report on an uplink from user equipment, in response to determining that the set is met,	"Examples of trigger parameters that are sent by the base station to the mobile station include REV_PDCH_REQCH_TRIGGERs[p] (where i represents a particular service instance), REV_PDCH_POWER_HEADROOM_INCREASEs, REV_PDCH_POWER_HEADROOM_DECREASEs, REV_PDCH_HEADROOM_DURATIONs, and REV_PDCH_MAX_POWER_UPDATE_DURATIONs. The REV_PDCH_REQCH_TRIGGERs[i] parameter contains at least the following fields: MIN_DURATION, to indicate a minimum duration at which a mobile station should send a reverse request message to the base station; . . . . The REV_PDCH_REQCH_TRIGGERs[i].MIN_DURATION field is set at a value to prevent the mobile station from transmitting reverse request messages too frequently. . . . Next, the mobile station detects (at 106) whether a trigger has occurred to send a reverse request message. If a trigger has occurred, based on the trigger parameters sent by the base station to the mobile station, the mobile station sends (at 108) a reverse request message on R-REQCH. Next, the base station performs (at 110) scheduling based on information in the reverse request message." *Id.* at [0044]-[0050] There are at least three triggers for sending a reverse request message. A first trigger is a buffer update trigger. This trigger involves determining whether the state of the parameter field REV_PDCH_REQCH_TRIGGER$_s$[i].USE_BUFFER_REPORTS is true, and whether a current system time (the time provided by the clock of the

Challenged Claim of the '676	Disclosure in Fong (Ex. 1004)
	mobile station) exceeds a time at which a reverse request message was last transmitted for the service instance i by the predetermined time duration specified by REV_PDCH_REQCH_TRIGGER$_s$[i].MIN_DURATION. The current system time is saved in a parameter saved_sys_time. The time that a reverse request message was last sent for the service instance i is stored in a parameter last_time_reported[i]. Thus, for a particular service instance i, if REV_PDCH_REQCH_TRIGGER$_s$[i].USE_BUFFER_REPORTS is true, and if saved_sys_time is equal to or greater than (last_time_reported[i]+REV_PDCH_REQCH_TRIGGER$_s$[i].MIN_DURATION), then that is a trigger (referred to as trigger **1**) to send a reverse request message for the purpose of updating the buffer status to the base station. *Id*. at [0052] "In addition, the mobile station also encodes (at 211) a value for the MAXIMUM_TPR field based on the current power headroom of the mobile station. The reverse request message containing the values set above is then sent on R-REQCH to the base station." *Id*. at [0058] In accordance with an embodiment of the invention, the reverse request message is communicated from the mobile station to the base station on a reverse request channel (R-REQCH). . . . In one implementation, the message format of a reverse request message is as follows: FIELD LENGTH (bits) RESERVED 1 MAXIMUM_TPR 4 SR_ID 3

Challenged Claim of the '676	Disclosure in Fong (Ex. 1004)
	EVENT 4 . . . In the reverse request message, the MAXIMUM_TPR field indicates the maximum traffic-to-pilot ratio for the reverse packet data channel. The traffic-to-pilot ratio represents the ratio of the energy of traffic channels to the pilot channel. The maximum traffic-to-pilot ratio is used as an indication of the maximum supportable data rate, where a higher traffic-to-pilot ratio implies a higher data rate. *Id.* at [0034-35] "In sum, the reverse request message contains information to enable the scheduler 40 in the base station 19 to determine data rate requirements of a corresponding mobile station. The MAXIMUM_TPR value provides insight into the maximum data rate supportable by the mobile station, based on power constraints. The EVENT field indicates the status of a buffer in the mobile station for a particular service instance. The buffer status can be used by the scheduler 40 to determine an expected data rate requirement on a reverse channel (e.g., R-PDCH). Thus, whereas the MAXIMUM_TPR field provides an indication of a power-limited data rate for transmissions on R-PDCH, the EVENT field provides an indication of a buffer-limited data rate for transmissions on R-PDCH." *Id.* at [0039] Another trigger (referred to as trigger **2**) that causes transmission of the reverse request message involves determining whether a maximum duration has elapsed during which a reverse request message has not been sent. For the scheduler **40** in the base station to accurately perform scheduling to properly arrange loading on R-PDCH, the scheduler **40** needs accurate buffer status and power headroom (data rate) information. Waiting too long between reverse request messages may result in inaccurate information

Challenged Claim of the '676	Disclosure in Fong (Ex. 1004)
	being used by the base station. Thus, trigger **2** relates to ensuring that the mobile station does not wait too long between transmission of the reverse request messages to the base station. According to trigger **2**, if saved_sys_time (the current mobile station system time) minus last_req_sent (the time at which a reverse request message was last sent for any service instance) is greater than or equal to REV_PDCH_MAX_POWER_UPDATE_DURATION$_s$, and buffer_status[N] is greater than zero, then a trigger to send the reverse request message has occurred. *Id.* at [0059]
[1c] wherein said at least one triggering criterion include at least one threshold having been reached,	"Examples of trigger parameters that are sent by the base station to the mobile station include REV_PDCH_REQCH_TRIGGERs[p] (where i represents a particular service instance), REV_PDCH_POWER_HEADROOM_INCREASEs, REV_PDCH_POWER_HEADROOM_DECREASEs, REV_PDCH_HEADROOM_DURATIONs, and REV_PDCH_MAX_POWER_UPDATE_DURATIONs. The REV_PDCH_REQCH_TRIGGERs[i] parameter contains at least the following fields: MIN_DURATION, to indicate a minimum duration at which a mobile station should send a reverse request message to the base station; . . . . The REV_PDCH_REQCH_TRIGGERs[i].MIN_DURATION field is set at a value to prevent the mobile station from transmitting reverse request messages too frequently. . . . Next, the mobile station detects (at 106) whether a trigger has occurred to send a reverse request message. If a trigger has occurred, based on the trigger parameters sent by the base station to the mobile station, the mobile station sends (at 108) a reverse request message on R-REQCH. Next, the

Challenged Claim of the '676	Disclosure in Fong (Ex. 1004)
	base station performs (at 110) scheduling based on information in the reverse request message." *Id.* at [0044]-[0050] There are at least three triggers for sending a reverse request message. A first trigger is a buffer update trigger. This trigger involves determining whether the state of the parameter field REV_PDCH_REQCH_TRIGGER$_s$[i].USE_BUFFER_REPORTS is true, and whether a current system time (the time provided by the clock of the mobile station) exceeds a time at which a reverse request message was last transmitted for the service instance i by the predetermined time duration specified by REV_PDCH_REQCH_TRIGGER$_s$[i].MIN_DURATION. The current system time is saved in a parameter saved_sys_time. The time that a reverse request message was last sent for the service instance i is stored in a parameter last_time_reported[i]. Thus, for a particular service instance i, if REV_PDCH_REQCH_TRIGGER$_s$[i].USE_BUFFER_REPORTS is true, and if saved_sys_time is equal to or greater than (last_time_reported[i]+REV_PDCH_REQCH_TRIGGER$_s$[i].MIN_DURATION), then that is a trigger (referred to as trigger **1**) to send a reverse request message for the purpose of updating the buffer status to the base station. *Id.* at [0052]
[1d] wherein said at least one triggering threshold is adjustable via a signal to the user equipment,	FIG. 2 is a message flow diagram of a procedure according to one embodiment for communicating reverse request messages containing buffer status and data rate information over a reverse wireless link. Initially, call setup messaging is exchanged (at **102**) between the base station **19** and the mobile station **16**. . . . The base station sends (at **104**) various messages to the mobile station, with such message(s) containing trigger parameters that are used by the mobile station to trigger the transmission of a reverse request

Challenged Claim of the '676	Disclosure in Fong (Ex. 1004)
	message on R-REQCH." *Id*. at [0043] "Examples of trigger parameters that are sent by the base station to the mobile station include REV_PDCH_REQCH_TRIGGERs[p] (where i represents a particular service instance), REV_PDCH_POWER_HEADROOM_INCREASEs, REV_PDCH_POWER_HEADROOM_DECREASEs, REV_PDCH_HEADROOM_DURATIONs, and REV_PDCH_MAX_POWER_UPDATE_DURATIONs. The REV_PDCH_REQCH_TRIGGERs[i] parameter contains at least the following fields: MIN_DURATION, to indicate a minimum duration at which a mobile station should send a reverse request message to the base station; and USE_POWER_REPORTS, to indicate if a change in power headroom by a specified amount at the mobile station is to be used to trigger the transmission of a reverse request message for the particular service instance i. The REV_PDCH_REQCH_TRIGGERs[i].MIN_DURATION field is set at a value to prevent the mobile station from transmitting reverse request messages too frequently." *Id*. at [0044]
[1e] wherein the set of at least one triggering criterion comprises a criterion being met based on reaching a threshold of the at least one threshold of k transmission time intervals following a previous power control headroom report, wherein k is an integer and	Referring to FIG. 1, a wireless or mobile communications network according to one embodiment includes components that operate according to CDMA (code-divisional multiple access) 2000. CDMA 2000 is defined by the CDMA 2000 family of standards (including the TIA-2000 standards, TIA-2001 standards, and the TIA-2000-D standards). However, in other embodiments, other types of wireless protocols can be used for communications in the wireless communications network, including other

Challenged Claim of the '676	Disclosure in Fong (Ex. 1004)
wherein said at least one threshold adjustable via the signal comprises adjusting the threshold integer k.	versions of CDMA, TDMA protocols, UMTS (Universal Mobile Telecommunications System) protocols, and other protocols. *Id.* at [0018] "Examples of trigger parameters that are sent by the base station to the mobile station include REV_PDCH_REQCH_TRIGGERs[p] (where i represents a particular service instance), REV_PDCH_POWER_HEADROOM_INCREASEs, REV_PDCH_POWER_HEADROOM_DECREASEs, REV_PDCH_HEADROOM_DURATIONs, and REV_PDCH_MAX_POWER_UPDATE_DURATIONs. The REV_PDCH_REQCH_TRIGGERs[i] parameter contains at least the following fields: MIN_DURATION, to indicate a minimum duration at which a mobile station should send a reverse request message to the base station; . . . . The REV_PDCH_REQCH_TRIGGERs[i].MIN_DURATION field is set at a value to prevent the mobile station from transmitting reverse request messages too frequently. . . . Next, the mobile station detects (at 106) whether a trigger has occurred to send a reverse request message. If a trigger has occurred, based on the trigger parameters sent by the base station to the mobile station, the mobile station sends (at 108) a reverse request message on R-REQCH. Next, the base station performs (at 110) scheduling based on information in the reverse request message." *Id.* at [0044]-[0050] There are at least three triggers for sending a reverse request message. A first trigger is a buffer update trigger. This trigger involves determining whether the state of the parameter field

Challenged Claim of the '676	Disclosure in Fong (Ex. 1004)
	REV_PDCH_REQCH_TRIGGER$_s$[i].USE_BUFFER_REPORTS is true, and whether a current system time (the time provided by the clock of the mobile station) exceeds a time at which a reverse request message was last transmitted for the service instance i by the predetermined time duration specified by REV_PDCH_REQCH_TRIGGER$_s$[i].MIN_DURATION. The current system time is saved in a parameter saved_sys_time. The time that a reverse request message was last sent for the service instance i is stored in a parameter last_time_reported[i]. Thus, for a particular service instance i, if REV_PDCH_REQCH_TRIGGER$_s$[i].USE_BUFFER_REPORTS is true, and if saved_sys_time is equal to or greater than (last_time_reported[i]+REV_PDCH_REQCH_TRIGGER$_s$[i].MIN_DURATION), then that is a trigger (referred to as trigger **1**) to send a reverse request message for the purpose of updating the buffer status to the base station. *Id.* at [0052]
19. An apparatus comprising:	
[19a] at least one processor; and	As further shown in FIG. 1, each mobile station **16** includes a processor **42** and a storage **44**. The processor **42** provides a processing core on which one or more software modules are executable to enable the mobile station to perform various tasks. Also, the mobile station **16** includes buffers **46** for temporarily holding data that are to be communicated over the reverse wireless link to the base station **19**. The base station **19** also includes a processor **48** and a storage **50** (or multiple processors and storages). The scheduler **40** can be a software module that is executable on the processor **48**.

Challenged Claim of the '676	Disclosure in Fong (Ex. 1004)
	Id. at [0031]
[19b] at least one memory including software, where the at least one memory and the software are configured, with the at least one processor, to cause the apparatus to at least:	"As further shown in FIG. 1, each mobile station **16** includes a processor **42** and a storage **44**. The processor **42** provides a processing core on which one or more software modules are executable to enable the mobile station to perform various tasks. Also, the mobile station **16** includes buffers **46** for temporarily holding data that are to be communicated over the reverse wireless link to the base station **19**. The base station **19** also includes a processor **48** and a storage **50** (or multiple processors and storages). The scheduler **40** can be a software module that is executable on the processor **48**." *Id*. at [0031]
[19c] determine that a set of at least one triggering criterion is met; and	*See* Element [1a].
[19d] provide a power control headroom report on an uplink from user equipment, in response to the set having been met,	*See* Element [1b].
[19e] wherein said at least one triggering criterion include at least one threshold having been reached,	*See* Element [1c].
[19f] wherein said at least one threshold is adjustable via a	*See* Element [1d].

Challenged Claim of the '676	Disclosure in Fong (Ex. 1004)
signal to the apparatus,	
[19g] wherein the set of at least one triggering criterion comprises a criterion being met based on reaching a threshold of the at least one threshold of k transmission time intervals following a previous power control headroom report, wherein k is an integer and wherein said at least one threshold adjustable via the signal comprises adjusting the threshold integer k.	*See* Element [1e].
33. A network element comprising:	
[33a] at least one processor; and	"As further shown in FIG. 1, each mobile station **16** includes a processor **42** and a storage **44**. The processor **42** provides a processing core on which one or more software modules are executable to enable the mobile station to perform various tasks. Also, the mobile station **16** includes buffers **46** for temporarily holding data that are to be communicated over the reverse wireless link to the base station **19**. The base station **19** also includes a processor **48** and a storage **50** (or multiple processors and storages). The scheduler **40** can be a software module that is executable on the processor **48**." *Id*. at [0031]
[33b] at least one memory including software, where the	"As further shown in FIG. 1, each mobile station **16** includes a processor **42**

Challenged Claim of the '676	Disclosure in Fong (Ex. 1004)
at least one memory and the software are configured, with the at least one processor, to cause the network element to at least:	and a storage **44**. The processor **42** provides a processing core on which one or more software modules are executable to enable the mobile station to perform various tasks. Also, the mobile station **16** includes buffers **46** for temporarily holding data that are to be communicated over the reverse wireless link to the base station **19**. The base station **19** also includes a processor **48** and a storage **50** (or multiple processors and storages). The scheduler **40** can be a software module that is executable on the processor **48**." *Id*. at [0031] To determine the bandwidth requirements of the mobile stations being served by the base station 19, the scheduler 40 uses the buffer status and maximum supportable data rate information provided in the reverse request message. In this manner, the scheduler 40 can determine a data rate to grant each mobile station in scheduled mode. Also, in one implementation, the scheduler 40 can use the reverse request message information to determine how much of the bandwidth of the reverse wireless link will be taken up by the autonomous mode mobile stations (the mobile stations transmitting in autonomous mode). Any remaining bandwidth of the reverse wireless link can then be allocated to scheduled mode mobile stations by the scheduler 40 explicitly assigning data rates to the scheduled mode mobile stations. In scheduled mode, assignment of a data rate to a mobile station can be performed by the base station sending a grant message in a grant channel (GCH) to a mobile station. *Id*. at [0033]
[33c] receive a power control	*See* Element [1b, 1c]

Challenged Claim of the '676	Disclosure in Fong (Ex. 1004)
headroom report on an uplink from user equipment, in response to the user equipment determining that a set of at least one triggering criterion is met because at least one threshold has been reached,	
[33d] wherein the set of at least one triggering criterion comprises a criterion being met based on reaching a threshold of the at least one threshold of k transmission time intervals following a previous power control headroom report,	*See* Element [1e]
[33e] wherein k is an integer and wherein said at least one threshold adjustable via the signal comprises adjusting the threshold integer k; and	*See* Element [1d, 1f]
[33f] provide a threshold adjustment signal to the user equipment in order to adjust the at least one threshold.	*See* Element [1d].

ATTACHMENT C

ATTACHMENT C TO EXHIBIT 1003

Invalidity Of Claims 1, 19, and 33 of U.S. Patent No. 8,457,676
In View Of U.S. Patent Application Pub. No. 2006/0140154 to Kwak et al. (Ex. 1005)

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
1. A method comprising:	
[1a] determining that a set of at east one triggering criterion is met; and	With reference to FIG. 6, a UE operation for generating data in the procedure illustrated in FIG. 5 will be described below. Referring to FIG. 6, upon receipt of an RLC PDU 601, a MAC-d entity 602 generates a MAC-d PDU by adding a MAC-d header to the RLC PDU 601. A MAC-e entity 603 creates a MAC-e PDU by adding a MAC-e header to the MAC-d PDU. The MAC-e PDU is delivered to a PHY layer 604, is subject to transport channel processing including an HARQ operation, and is mapped to a PHY channel. The PHY channel is then transmitted as indicated by reference numeral 605. All this procedure illustrated in FIG. 6 is carried out in one UE 610. *Id.* at [0056-57]. FIG. 9 illustrates periodic TPS transmission from a UE for E-DCH scheduling according to another exemplary embodiment of the present invention. The UE transmits a TPS every predetermined TPS period. In the presence of E-DCH data in time intervals defined by the TPS period, a TPS is transmitted along with the E-DCH data in a MAC-e PDU. In the absence of E-DCH data, the MAC-e PDU contains only the TPS. Referring to FIG. 9, when new data is buffered, a UE 904 first transmits a BO & TPS 906 in an initial MAC-e PDU to a Node B 901 on an E-DCH

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	905. The initial MAC-e PDU includes only the BO or/and TPS in a MAC-e header with no data in payload and is transmitted by MAC-e signaling. Upon receipt of the BO or/and TPS, the Node B 901 determines from the BO whether the UE 904 has E-DCH data and schedules based on the BO and the TPS. The Node B 901 then transmits scheduling grant information to the UE 904 on a scheduling grant channel 902 as a result of the scheduling. The scheduling grant information can be an absolute grant or a relative grant. The Node B 901 receives the MAC-e PDU, performs an HARQ operation, and transmits an ACK/NACK signal to the UE 904 on an ACK/NACK channel 903. The UE 904 transmits the E-DCH data based on the scheduling grant information and the ACK/NACK signal. In accordance with the second exemplary embodiment of the present invention, the UE 904 transmits a TPS every predetermined TPS period 910. For example, in the presence of E-DCH data, the UE 904 transmits a TPS in the MAC-e header of a MAC-e PDU with the E-DCH data. In the absence of E-DCH data, the UE 904 transmits a MAC-e PDU containing the TPS only. Thus, MAC-e PDUs with TPSs are transmitted in time intervals 907, 908 and 909 each apart from the following time interval by the TPS period 910. The time intervals 907, 908 and 909 are limited to the case where an ACK signal is received for the previous MAC-e PDU or the number of transmissions of the previous MAC-e PDU has reached a maximum allowed number in an HARQ process. In other words, a TPS can be transmitted only in a time interval in which an initial transmission is possible. All conditions considered, the UE 904 transmits a TPS in the MAC-e header of an initial transmission MAC-e PDU in the earliest time interval in which TPS transmission is possible after expiration of the TPS period 910, that is, when

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	the TPS period 910 has expired and the initial transmission MAC-e PDU has been created. The TPS period 910 is a predetermined fixed value or notified to the UE and the Node B from the RNC by upper layer signaling using Radio Resource Control (RRC) and Node B Application Part (NBAP) protocols. In a BO transmission time interval 911, a TPS can also be transmitted in a MAC-e header even though the BO transmission time interval 911 is not a time interval in which TPS transmission is allowed according to the TPS period 910. Before a time interval 907, that is, before the E-DCH data transmission, no TPSs are transmitted irrespective of the TPS period 910, except for a first BO transmission period 906 indicating the start of the E-DCH data transmission. In the time interval 906, the TPS and the BO are transmitted together. When there is no need for transmitting E-DCH data any longer, that is, when the buffer is empty in the UE 904, the UE 904 discontinues the E-DCH data transmission as indicated by reference numeral 912. After receiving an initial MAC-e PDU containing a BO and a TPS only, the Node B 901 extracts the TPS from the first MAC-e PDU including data. Then, the Node B 904 extracts a TPS from a MAC-e PDU received every TPS period 910. *Id.* at [0073-81] The UE transmits a TPS when a predetermined event is fulfilled. When the event has occurred and E-DCH data exists, the UE transmits the E-DCH data and a TPS in a MAC-e PDU. In the absence of E-DCH data, the UE transmits a MAC-e PDU including only the TPS.

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	FIG. 11 illustrates periodic or event-triggered TPS transmission from a UE for E-DCH scheduling according to a fourth exemplary embodiment of the present invention. . . . For instance, when the difference between a TPS transmitted in the previous MAC-e PDU and the current TPS exceeds a predetermined threshold, this is an event that triggers TPS transmission. The UE 1004 transmits the TPS in a MAC-e header in a transmission time interval following the event. The threshold is a predetermined fixed value or notified to the UE and the Node B from the RNC by RRC and NBAP upper signaling. Many other events that trigger TPS transmission can be defined. *Id.* at [0083, 0087] The UE transmits a TPS not only when a predetermined event is fulfilled but also every predetermined TPS period. As the UE transmits a TPS in an event-triggered manner and in addition, periodically, the periodic TPS transmission ensures stable TPS transmission despite failure of the event-triggered TPS transmission. When either the event has occurred or the TPS period has expired, in the presence of E-DCH data, the TPS is transmitted along with the E-DCH data in a MAC-e PDU. In the absence of E-DCH data, the MAC-e PDU contains only the TPS. . . . The UE 1104 transmits the E-DCH data based on the scheduling grant information and the ACK/NACK signal. In accordance with the fourth exemplary embodiment of the present invention, the UE 1104 transmits a TPS every predetermined TPS period 1111. Besides the periodic TPS transmission, the UE 1104 additionally transmits a TPS when the event

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	occurs. In the presence of E-DCH data, the UE 1104 transmits a TPS in the MAC-e header of a MAC-e PDU with the E-DCH data. In the absence of E-DCH data, the UE 1104 transmits a MAC-e PDU containing the TPS only. For instance, when the difference between a TPS transmitted in the previous MAC-e PDU and the current TPS exceeds a predetermined threshold, this is an event that triggers TPS transmission. The UE 1104 transmits the TPS in a MAC-e header in a transmission time interval following the event. The threshold is a predetermined fixed value or notified to the UE and the Node B from the RNC by RRC and NBAP upper signaling. Many other events that trigger TPS transmission can be defined. The TPS period 1111 is also a predetermined fixed value or notified to the UE and the Node B by RRC and NBAP upper signaling. In time intervals 1107, 1109 and 1110, the UE 1104 transmits TPSs according to the TPS period 1111. Also, when the UE 1104 detects occurrence of the event in a time interval 1112, it transmits a TPS in the following time interval 1113. The time intervals 1107, 1109, 1110 and 1113 carrying the TPSs are limited to the case where an ACK signal is received for the previous MAC-e PDU or the number of transmissions of the previous MAC-e PDU has reached a maximum allowed number in an HARQ process. In other words, a TPS can be transmitted only in a time interval in which an initial transmission is possible. Therefore, all conditions considered, the UE 1104 transmits a TPS in the MAC-e header of an initial transmission MAC-e PDU in the earliest time interval in which TPS transmission is possible after expiration of the TPS period 1111 or occurrence of the event, that is, when the TPS period 1111 has expired or the event has occurred, and the initial transmission MAC-e PDU has been created.

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	Id. at [0092-0100]. The UE monitors a predetermined TPS period. Only when a predetermined event is fulfilled upon expiration of the TPS period, the UE transmits a TPS. When the TPS period has expired and the event has occurred, in the presence of E-DCH data, the TPS is transmitted along with the E-DCH data in a MAC-e PDU. In the absence of E-DCH data, the MAC-e PDU contains only the TPS. Referring to FIG. 12, when new data is buffered, a UE 1204 first transmits a BO & TPS 1206 in an initial MAC-e PDU to a Node B 1201 on an E-DCH 1205. The initial MAC-e PDU includes only the BO or/and TPS in a MAC-e header with no data in payload and is transmitted by MAC-e signaling. . . . The UE 1204 transmits the E-DCH data based on the scheduling grant information and the ACK/NACK signal. In accordance with the fifth exemplary embodiment of the present invention, the UE 1204 determines whether the event has occurred in time intervals 1207, 1209 and 1211 defined by the TPS period 1210 and transmits a TPS in the time interval 1211 for which the event is fulfilled. In the presence of E-DCH data, the UE 1204 transmits a TPS in the MAC-e header of a MAC-e PDU with the E-DCH data. In the absence of E-DCH data, the UE 1204 transmits a MAC-e PDU containing the TPS only. For instance, when the difference between the previous TPS and the current TPS exceeds a predetermined threshold, this is an event that triggers TPS transmission. The UE 1204 transmits the TPS in a MAC-e header in a transmission time interval following the event. The threshold is a predetermined fixed value or notified to the UE and the Node B from the

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	RNC by RRC and NBAP upper signaling. Many other events that trigger TPS transmission can be defined. The TPS period 1210 is also a predetermined fixed value or notified to the UE and the Node B by RRC and NBAP upper signaling. In time intervals 1207, 1209 and 1211 each apart from the following time interval by the TPS period 1210, the UE 1204 determines whether the event has occurred in the previous time interval. Upon occurrence of the event in a time interval 1212, the UE 1204 transmits a TPS in the following time interval 1211. In the time intervals 1207 and 1209, no TPSs are transmitted because the TPS period 1210 has expired but the event has not occurred. The time interval 1211 carrying the TPS is limited to the case where an ACK signal is received for the previous MAC-e PDU or the number of transmissions of the previous MAC-e PDU has reached a maximum allowed number in an HARQ process. In other words, a TPS can be transmitted only in a time interval in which an initial transmission is possible. Therefore, all conditions considered, the UE 1104 transmits a TPS in the MAC-e header of an initial transmission MAC-e PDU in the earliest time interval when the TPS period 1210 has expired after occurrence of the event. *Id.* at [0104-0111].
[1b] providing a power control headroom report on an uplink from user equipment, in response to determining that the set is met,	An exemplary object of the present invention is to transmit the TPS of a UE to a Node B. The TPS is expressed as the maximum transmit power of the UE or the transmit power of a control channel alone from the UE. Alternatively, TPS is expressed as a maximum data rate available to the UE or a TF. Alternatively, the uplink transmit power information can be the ratio of the maximum transmit power to the transmit power of the control

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	channel, that is, the power margin of the UE. In this context, the TPS represents the uplink channel status of the UE. The TPS is transmitted to the Node B by MAC information in the exemplary embodiments of the present invention. As implied from its appellation, the MAC layer is responsible for medium access control between the RLC layer and the PHY layer. With the introduction of the E-DCH, the MAC layer configuration illustrated in FIG. 2 has been modified so that for the E-DCH functionality, a MAC-e entity is newly defined to work in conjunction with the existing MAC-d entity configured for a Dedicated CHannel (DCH). The MAC-e entity exists between the MAC-d entity and the PHY layer. As data is processed in the MAC layer, its format is changed as illustrated in FIG. 5. *Id.* at [0051-52] With reference to FIG. 6, a UE operation for generating data in the procedure illustrated in FIG. 5 will be described below. Referring to FIG. 6, upon receipt of an RLC PDU 601, a MAC-d entity 602 generates a MAC-d PDU by adding a MAC-d header to the RLC PDU 601. A MAC-e entity 603 creates a MAC-e PDU by adding a MAC-e header to the MAC-d PDU. The MAC-e PDU is delivered to a PHY layer 604, is subject to transport channel processing including an HARQ operation, and is mapped to a PHY channel. The PHY channel is then transmitted as indicated by reference numeral 605. All this procedure illustrated in FIG. 6 is carried out in one UE 610. *Id.* at [0056-57]. FIG. 9 illustrates periodic TPS transmission from a UE for E-DCH scheduling according to another exemplary embodiment of the present invention.

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	The UE transmits a TPS every predetermined TPS period. In the presence of E-DCH data in time intervals defined by the TPS period, a TPS is transmitted along with the E-DCH data in a MAC-e PDU. In the absence of E-DCH data, the MAC-e PDU contains only the TPS. Referring to FIG. 9, when new data is buffered, a UE 904 first transmits a BO & TPS 906 in an initial MAC-e PDU to a Node B 901 on an E-DCH 905. The initial MAC-e PDU includes only the BO or/and TPS in a MAC-e header with no data in payload and is transmitted by MAC-e signaling. Upon receipt of the BO or/and TPS, the Node B 901 determines from the BO whether the UE 904 has E-DCH data and schedules based on the BO and the TPS. The Node B 901 then transmits scheduling grant information to the UE 904 on a scheduling grant channel 902 as a result of the scheduling. The scheduling grant information can be an absolute grant or a relative grant. The Node B 901 receives the MAC-e PDU, performs an HARQ operation, and transmits an ACK/NACK signal to the UE 904 on an ACK/NACK channel 903. The UE 904 transmits the E-DCH data based on the scheduling grant information and the ACK/NACK signal. In accordance with the second exemplary embodiment of the present invention, the UE 904 transmits a TPS every predetermined TPS period 910. For example, in the presence of E-DCH data, the UE 904 transmits a TPS in the MAC-e header of a MAC-e PDU with the E-DCH data. In the absence of E-DCH data, the UE 904 transmits a MAC-e PDU containing the TPS only. Thus, MAC-e PDUs with TPSs are transmitted in time intervals 907, 908 and 909 each apart from the following time interval by the TPS period 910. The time intervals 907, 908 and 909 are limited to the case where an ACK signal is received for the previous MAC-e PDU or the number of

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	transmissions of the previous MAC-e PDU has reached a maximum allowed number in an HARQ process. In other words, a TPS can be transmitted only in a time interval in which an initial transmission is possible. All conditions considered, the UE 904 transmits a TPS in the MAC-e header of an initial transmission MAC-e PDU in the earliest time interval in which TPS transmission is possible after expiration of the TPS period 910, that is, when the TPS period 910 has expired and the initial transmission MAC-e PDU has been created. The TPS period 910 is a predetermined fixed value or notified to the UE and the Node B from the RNC by upper layer signaling using Radio Resource Control (RRC) and Node B Application Part (NBAP) protocols. In a BO transmission time interval 911, a TPS can also be transmitted in a MAC-e header even though the BO transmission time interval 911 is not a time interval in which TPS transmission is allowed according to the TPS period 910. Before a time interval 907, that is, before the E-DCH data transmission, no TPSs are transmitted irrespective of the TPS period 910, except for a first BO transmission period 906 indicating the start of the E-DCH data transmission. In the time interval 906, the TPS and the BO are transmitted together. When there is no need for transmitting E-DCH data any longer, that is, when the buffer is empty in the UE 904, the UE 904 discontinues the E-DCH data transmission as indicated by reference numeral 912. After receiving an initial MAC-e PDU containing a BO and a TPS only, the Node B 901 extracts the TPS from the first MAC-e PDU including data. Then, the Node B 904 extracts a TPS from a MAC-e PDU received every TPS period 910. *Id.* at [0073-81]

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	The UE transmits a TPS when a predetermined event is fulfilled. When the event has occurred and E-DCH data exists, the UE transmits the E-DCH data and a TPS in a MAC-e PDU. In the absence of E-DCH data, the UE transmits a MAC-e PDU including only the TPS. FIG. 11 illustrates periodic or event-triggered TPS transmission from a UE for E-DCH scheduling according to a fourth exemplary embodiment of the present invention. . . . For instance, when the difference between a TPS transmitted in the previous MAC-e PDU and the current TPS exceeds a predetermined threshold, this is an event that triggers TPS transmission. The UE 1004 transmits the TPS in a MAC-e header in a transmission time interval following the event. The threshold is a predetermined fixed value or notified to the UE and the Node B from the RNC by RRC and NBAP upper signaling. Many other events that trigger TPS transmission can be defined. *Id.* at [0083, 0087] The UE transmits a TPS not only when a predetermined event is fulfilled but also every predetermined TPS period. As the UE transmits a TPS in an event-triggered manner and in addition, periodically, the periodic TPS transmission ensures stable TPS transmission despite failure of the event-triggered TPS transmission. When either the event has occurred or the TPS period has expired, in the presence of E-DCH data, the TPS is transmitted along with the E-DCH data in a MAC-e PDU. In the absence of E-DCH data, the MAC-e PDU contains only the TPS. . . .

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	The UE 1104 transmits the E-DCH data based on the scheduling grant information and the ACK/NACK signal. In accordance with the fourth exemplary embodiment of the present invention, the UE 1104 transmits a TPS every predetermined TPS period 1111. Besides the periodic TPS transmission, the UE 1104 additionally transmits a TPS when the event occurs. In the presence of E-DCH data, the UE 1104 transmits a TPS in the MAC-e header of a MAC-e PDU with the E-DCH data. In the absence of E-DCH data, the UE 1104 transmits a MAC-e PDU containing the TPS only. For instance, when the difference between a TPS transmitted in the previous MAC-e PDU and the current TPS exceeds a predetermined threshold, this is an event that triggers TPS transmission. The UE 1104 transmits the TPS in a MAC-e header in a transmission time interval following the event. The threshold is a predetermined fixed value or notified to the UE and the Node B from the RNC by RRC and NBAP upper signaling. Many other events that trigger TPS transmission can be defined. The TPS period 1111 is also a predetermined fixed value or notified to the UE and the Node B by RRC and NBAP upper signaling. In time intervals 1107, 1109 and 1110, the UE 1104 transmits TPSs according to the TPS period 1111. Also, when the UE 1104 detects occurrence of the event in a time interval 1112, it transmits a TPS in the following time interval 1113. The time intervals 1107, 1109, 1110 and 1113 carrying the TPSs are limited to the case where an ACK signal is received for the previous MAC-e PDU or the number of transmissions of the previous MAC-e PDU has reached a maximum allowed number in an HARQ process. In other words, a TPS can be transmitted only in a time interval in which an initial transmission is possible. Therefore, all conditions considered, the UE 1104 transmits a TPS in the

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	MAC-e header of an initial transmission MAC-e PDU in the earliest time interval in which TPS transmission is possible after expiration of the TPS period 1111 or occurrence of the event, that is, when the TPS period 1111 has expired or the event has occurred, and the initial transmission MAC-e PDU has been created. *Id.* at [0092-0100]. The UE monitors a predetermined TPS period. Only when a predetermined event is fulfilled upon expiration of the TPS period, the UE transmits a TPS. When the TPS period has expired and the event has occurred, in the presence of E-DCH data, the TPS is transmitted along with the E-DCH data in a MAC-e PDU. In the absence of E-DCH data, the MAC-e PDU contains only the TPS. Referring to FIG. 12, when new data is buffered, a UE 1204 first transmits a BO & TPS 1206 in an initial MAC-e PDU to a Node B 1201 on an E-DCH 1205. The initial MAC-e PDU includes only the BO or/and TPS in a MAC-e header with no data in payload and is transmitted by MAC-e signaling. . . . The UE 1204 transmits the E-DCH data based on the scheduling grant information and the ACK/NACK signal. In accordance with the fifth exemplary embodiment of the present invention, the UE 1204 determines whether the event has occurred in time intervals 1207, 1209 and 1211 defined by the TPS period 1210 and transmits a TPS in the time interval 1211 for which the event is fulfilled. In the presence of E-DCH data, the UE 1204 transmits a TPS in the MAC-e header of a MAC-e PDU with the E-DCH data. In the absence of E-DCH data, the UE 1204 transmits a MAC-e PDU containing the TPS only.

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	For instance, when the difference between the previous TPS and the current TPS exceeds a predetermined threshold, this is an event that triggers TPS transmission. The UE 1204 transmits the TPS in a MAC-e header in a transmission time interval following the event. The threshold is a predetermined fixed value or notified to the UE and the Node B from the RNC by RRC and NBAP upper signaling. Many other events that trigger TPS transmission can be defined. The TPS period 1210 is also a predetermined fixed value or notified to the UE and the Node B by RRC and NBAP upper signaling. In time intervals 1207, 1209 and 1211 each apart from the following time interval by the TPS period 1210, the UE 1204 determines whether the event has occurred in the previous time interval. Upon occurrence of the event in a time interval 1212, the UE 1204 transmits a TPS in the following time interval 1211. In the time intervals 1207 and 1209, no TPSs are transmitted because the TPS period 1210 has expired but the event has not occurred. The time interval 1211 carrying the TPS is limited to the case where an ACK signal is received for the previous MAC-e PDU or the number of transmissions of the previous MAC-e PDU has reached a maximum allowed number in an HARQ process. In other words, a TPS can be transmitted only in a time interval in which an initial transmission is possible. Therefore, all conditions considered, the UE 1104 transmits a TPS in the MAC-e header of an initial transmission MAC-e PDU in the earliest time interval when the TPS period 1210 has expired after occurrence of the event. *Id.* at [0104-0111].
[1c] wherein said at least one	FIG. 9 illustrates periodic TPS transmission from a UE for E-DCH

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
triggering criterion include at least one threshold having been reached,	scheduling according to another exemplary embodiment of the present invention. The UE transmits a TPS every predetermined TPS period. In the presence of E-DCH data in time intervals defined by the TPS period, a TPS is transmitted along with the E-DCH data in a MAC-e PDU. In the absence of E-DCH data, the MAC-e PDU contains only the TPS. . . . The UE 904 transmits the E-DCH data based on the scheduling grant information and the ACK/NACK signal. In accordance with the second exemplary embodiment of the present invention, the UE 904 transmits a TPS every predetermined TPS period 910. For example, in the presence of E-DCH data, the UE 904 transmits a TPS in the MAC-e header of a MAC-e PDU with the E-DCH data. In the absence of E-DCH data, the UE 904 transmits a MAC-e PDU containing the TPS only. Thus, MAC-e PDUs with TPSs are transmitted in time intervals 907, 908 and 909 each apart from the following time interval by the TPS period 910. . . . All conditions considered, the UE 904 transmits a TPS in the MAC-e header of an initial transmission MAC-e PDU in the earliest time interval in which TPS transmission is possible after expiration of the TPS period 910, that is, when the TPS period 910 has expired and the initial transmission MAC-e PDU has been created. The TPS period 910 is a predetermined fixed value or notified to the UE and the Node B from the RNC by upper layer signaling using Radio Resource Control (RRC) and Node B Application Part (NBAP) protocols. *Id.* at [0073-81]

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	The UE transmits a TPS when a predetermined event is fulfilled. When the event has occurred and E-DCH data exists, the UE transmits the E-DCH data and a TPS in a MAC-e PDU. In the absence of E-DCH data, the UE transmits a MAC-e PDU including only the TPS. FIG. 11 illustrates periodic or event-triggered TPS transmission from a UE for E-DCH scheduling according to a fourth exemplary embodiment of the present invention. . . . For instance, when the difference between a TPS transmitted in the previous MAC-e PDU and the current TPS exceeds a predetermined threshold, this is an event that triggers TPS transmission. The UE 1004 transmits the TPS in a MAC-e header in a transmission time interval following the event. The threshold is a predetermined fixed value or notified to the UE and the Node B from the RNC by RRC and NBAP upper signaling. Many other events that trigger TPS transmission can be defined. *Id.* at [0083, 0087] The UE transmits a TPS not only when a predetermined event is fulfilled but also every predetermined TPS period. As the UE transmits a TPS in an event-triggered manner and in addition, periodically, the periodic TPS transmission ensures stable TPS transmission despite failure of the event-triggered TPS transmission. When either the event has occurred or the TPS period has expired, in the presence of E-DCH data, the TPS is transmitted along with the E-DCH data in a MAC-e PDU. In the absence of E-DCH data, the MAC-e PDU contains only the TPS. . . . The UE 1104 transmits the E-DCH data based on the scheduling grant

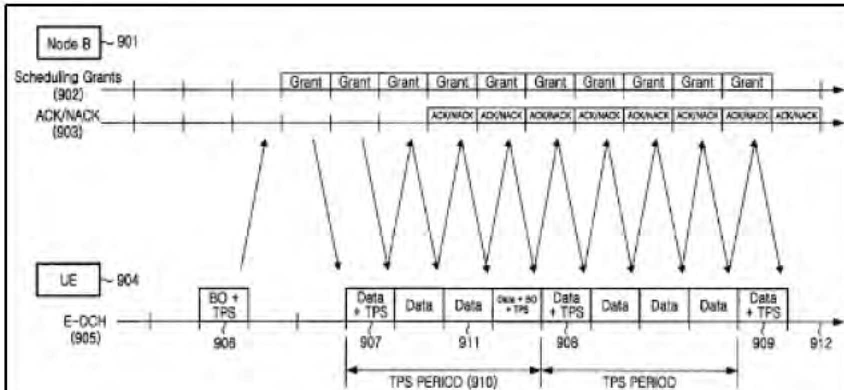
Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	information and the ACK/NACK signal. In accordance with the fourth exemplary embodiment of the present invention, the UE 1104 transmits a TPS every predetermined TPS period 1111. Besides the periodic TPS transmission, the UE 1104 additionally transmits a TPS when the event occurs. In the presence of E-DCH data, the UE 1104 transmits a TPS in the MAC-e header of a MAC-e PDU with the E-DCH data. In the absence of E-DCH data, the UE 1104 transmits a MAC-e PDU containing the TPS only. For instance, when the difference between a TPS transmitted in the previous MAC-e PDU and the current TPS exceeds a predetermined threshold, this is an event that triggers TPS transmission. The UE 1104 transmits the TPS in a MAC-e header in a transmission time interval following the event. The threshold is a predetermined fixed value or notified to the UE and the Node B from the RNC by RRC and NBAP upper signaling. Many other events that trigger TPS transmission can be defined. The TPS period 1111 is also a predetermined fixed value or notified to the UE and the Node B by RRC and NBAP upper signaling. In time intervals 1107, 1109 and 1110, the UE 1104 transmits TPSs according to the TPS period 1111. Also, when the UE 1104 detects occurrence of the event in a time interval 1112, it transmits a TPS in the following time interval 1113. The time intervals 1107, 1109, 1110 and 1113 carrying the TPSs are limited to the case where an ACK signal is received for the previous MAC-e PDU or the number of transmissions of the previous MAC-e PDU has reached a maximum allowed number in an HARQ process. In other words, a TPS can be transmitted only in a time interval in which an initial transmission is possible. Therefore, all conditions considered, the UE 1104 transmits a TPS in the MAC-e header of an initial transmission MAC-e PDU in the earliest time

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	interval in which TPS transmission is possible after expiration of the TPS period 1111 or occurrence of the event, that is, when the TPS period 1111 has expired or the event has occurred, and the initial transmission MAC-e PDU has been created. *Id.* at [0092-0100]. The UE monitors a predetermined TPS period. Only when a predetermined event is fulfilled upon expiration of the TPS period, the UE transmits a TPS. When the TPS period has expired and the event has occurred, in the presence of E-DCH data, the TPS is transmitted along with the E-DCH data in a MAC-e PDU. In the absence of E-DCH data, the MAC-e PDU contains only the TPS. Referring to FIG. 12, when new data is buffered, a UE 1204 first transmits a BO & TPS 1206 in an initial MAC-e PDU to a Node B 1201 on an E-DCH 1205. The initial MAC-e PDU includes only the BO or/and TPS in a MAC-e header with no data in payload and is transmitted by MAC-e signaling. . . . The UE 1204 transmits the E-DCH data based on the scheduling grant information and the ACK/NACK signal. In accordance with the fifth exemplary embodiment of the present invention, the UE 1204 determines whether the event has occurred in time intervals 1207, 1209 and 1211 defined by the TPS period 1210 and transmits a TPS in the time interval 1211 for which the event is fulfilled. In the presence of E-DCH data, the UE 1204 transmits a TPS in the MAC-e header of a MAC-e PDU with the E-DCH data. In the absence of E-DCH data, the UE 1204 transmits a MAC-e PDU containing the TPS only. For instance, when the difference between the previous TPS and the current

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	TPS exceeds a predetermined threshold, this is an event that triggers TPS transmission. The UE 1204 transmits the TPS in a MAC-e header in a transmission time interval following the event. The threshold is a predetermined fixed value or notified to the UE and the Node B from the RNC by RRC and NBAP upper signaling. Many other events that trigger TPS transmission can be defined. The TPS period 1210 is also a predetermined fixed value or notified to the UE and the Node B by RRC and NBAP upper signaling. In time intervals 1207, 1209 and 1211 each apart from the following time interval by the TPS period 1210, the UE 1204 determines whether the event has occurred in the previous time interval. Upon occurrence of the event in a time interval 1212, the UE 1204 transmits a TPS in the following time interval 1211. In the time intervals 1207 and 1209, no TPSs are transmitted because the TPS period 1210 has expired but the event has not occurred. The time interval 1211 carrying the TPS is limited to the case where an ACK signal is received for the previous MAC-e PDU or the number of transmissions of the previous MAC-e PDU has reached a maximum allowed number in an HARQ process. In other words, a TPS can be transmitted only in a time interval in which an initial transmission is possible. Therefore, all conditions considered, the UE 1104 transmits a TPS in the MAC-e header of an initial transmission MAC-e PDU in the earliest time interval when the TPS period 1210 has expired after occurrence of the event. *Id.* at [0104-0111].
[1d] wherein said at least one triggering threshold is adjustable via a signal to the user equipment,	The TPS period 910 is a predetermined fixed value or notified to the UE and the Node B from the RNC by upper layer signaling using Radio Resource Control (RRC) and Node B Application Part (NBAP) protocols.

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	Id. at [0078] The threshold is a predetermined fixed value or notified to the UE and the Node B from the RNC by RRC and NBAP upper signaling. Many other events that trigger TPS transmission can be defined. *Id.* at [0087] The threshold is a predetermined fixed value or notified to the UE and the Node B from the RNC by RRC and NBAP upper signaling. Many other events that trigger TPS transmission can be defined. The TPS period 1111 is also a predetermined fixed value or notified to the UE and the Node B by RRC and NBAP upper signaling. *Id.* at [0097] The UE 1204 transmits the TPS in a MAC-e header in a transmission time interval following the event. The threshold is a predetermined fixed value or notified to the UE and the Node B from the RNC by RRC and NBAP upper signaling. Many other events that trigger TPS transmission can be defined. The TPS period 1210 is also a predetermined fixed value or notified to the UE and the Node B by RRC and NBAP upper signaling. *Id.* at [0108-109]
[1e] wherein the set of at least one triggering criterion comprises a criterion being met based on reaching a threshold of the at least one threshold of k transmission time intervals following a previous power	FIG. 9 illustrates periodic TPS transmission from a UE for E-DCH scheduling according to another exemplary embodiment of the present invention. The UE transmits a TPS every predetermined TPS period. In the presence of E-DCH data in time intervals defined by the TPS period, a TPS is transmitted along with the E-DCH data in a MAC-e PDU. In the absence of

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
control headroom report, wherein k is an integer and wherein said at least one threshold adjustable via the signal comprises adjusting the threshold integer k.	E-DCH data, the MAC-e PDU contains only the TPS. . . . The UE 904 transmits the E-DCH data based on the scheduling grant information and the ACK/NACK signal. In accordance with the second exemplary embodiment of the present invention, the UE 904 transmits a TPS every predetermined TPS period 910. For example, in the presence of E-DCH data, the UE 904 transmits a TPS in the MAC-e header of a MAC-e PDU with the E-DCH data. In the absence of E-DCH data, the UE 904 transmits a MAC-e PDU containing the TPS only. Thus, MAC-e PDUs with TPSs are transmitted in time intervals 907, 908 and 909 each apart from the following time interval by the TPS period 910. The time intervals 907, 908 and 909 are limited to the case where an ACK signal is received for the previous MAC-e PDU or the number of transmissions of the previous MAC-e PDU has reached a maximum allowed number in an HARQ process. In other words, a TPS can be transmitted only in a time interval in which an initial transmission is possible. All conditions considered, the UE 904 transmits a TPS in the MAC-e header of an initial transmission MAC-e PDU in the earliest time interval in which TPS transmission is possible after expiration of the TPS period 910, that is, when the TPS period 910 has expired and the initial transmission MAC-e PDU has been created. The TPS period 910 is a predetermined fixed value or notified to the UE and the Node B from the RNC by upper layer signaling using Radio Resource Control (RRC) and Node B Application Part (NBAP) protocols. In a BO transmission time interval 911, a TPS can also be transmitted in a MAC-e header even though the BO transmission time interval 911 is not a time interval in which TPS transmission is allowed according to the TPS

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	period 910. Before a time interval 907, that is, before the E-DCH data transmission, no TPSs are transmitted irrespective of the TPS period 910, except for a first BO transmission period 906 indicating the start of the E-DCH data transmission. In the time interval 906, the TPS and the BO are transmitted together. When there is no need for transmitting E-DCH data any longer, that is, when the buffer is empty in the UE 904, the UE 904 discontinues the E-DCH data transmission as indicated by reference numeral 912. After receiving an initial MAC-e PDU containing a BO and a TPS only, the Node B 901 extracts the TPS from the first MAC-e PDU including data. Then, the Node B 904 extracts a TPS from a MAC-e PDU received every TPS period 910.  FIG.9 *Id.* at [0073-81]; Fig. 9 FIG. 11 illustrates periodic or event-triggered TPS transmission from a UE for E-DCH scheduling according to a fourth exemplary embodiment of the present invention.

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	The UE transmits a TPS not only when a predetermined event is fulfilled but also every predetermined TPS period. As the UE transmits a TPS in an event-triggered manner and in addition, periodically, the periodic TPS transmission ensures stable TPS transmission despite failure of the event-triggered TPS transmission. When either the event has occurred or the TPS period has expired, in the presence of E-DCH data, the TPS is transmitted along with the E-DCH data in a MAC-e PDU. In the absence of E-DCH data, the MAC-e PDU contains only the TPS. . . . The UE 1104 transmits the E-DCH data based on the scheduling grant information and the ACK/NACK signal. In accordance with the fourth exemplary embodiment of the present invention, the UE 1104 transmits a TPS every predetermined TPS period 1111. Besides the periodic TPS transmission, the UE 1104 additionally transmits a TPS when the event occurs. In the presence of E-DCH data, the UE 1104 transmits a TPS in the MAC-e header of a MAC-e PDU with the E-DCH data. In the absence of E-DCH data, the UE 1104 transmits a MAC-e PDU containing the TPS only. For instance, when the difference between a TPS transmitted in the previous MAC-e PDU and the current TPS exceeds a predetermined threshold, this is an event that triggers TPS transmission. The UE 1104 transmits the TPS in a MAC-e header in a transmission time interval following the event. The threshold is a predetermined fixed value or notified to the UE and the Node B from the RNC by RRC and NBAP upper signaling. Many other events that trigger TPS transmission can be defined. The TPS period 1111 is also a predetermined fixed value or notified to the UE and the Node B by RRC and NBAP upper signaling. In time intervals 1107, 1109 and 1110, the UE 1104 transmits TPSs

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	according to the TPS period 1111. Also, when the UE 1104 detects occurrence of the event in a time interval 1112, it transmits a TPS in the following time interval 1113. The time intervals 1107, 1109, 1110 and 1113 carrying the TPSs are limited to the case where an ACK signal is received for the previous MAC-e PDU or the number of transmissions of the previous MAC-e PDU has reached a maximum allowed number in an HARQ process. In other words, a TPS can be transmitted only in a time interval in which an initial transmission is possible. Therefore, all conditions considered, the UE 1104 transmits a TPS in the MAC-e header of an initial transmission MAC-e PDU in the earliest time interval in which TPS transmission is possible after expiration of the TPS period 1111 or occurrence of the event, that is, when the TPS period 1111 has expired or the event has occurred, and the initial transmission MAC-e PDU has been created. In a BO transmission time interval 1108, a TPS can also be transmitted in a MAC-e header even though the BO transmission time interval 1108 is neither a time interval in which TPS transmission is allowed according to the TPS period 1111 nor a time interval following occurrence of the event. Before a time interval 1107, that is, before the E-DCH data transmission, no TPSs are transmitted irrespective of the TPS period 1111 and the event, except for a first BO transmission period 1106 indicating the start of the E-DCH data transmission. In the time interval 1106, the TPS and the BO are transmitted together. When there is no need for transmitting E-DCH data any longer, that is, when the buffer is empty in the UE 1104, the UE 1104 discontinues the E-DCH data transmission as indicated by reference numeral 1114. After receiving an initial MAC-e PDU containing a BO and a TPS only, the

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	Node B 1101 extracts the TPS from the first MAC-e PDU including data. Then, the Node B 1104 extracts a TPS from a MAC-e PDU received every TPS period 1111. Also, every time the Node B 1101 receives a MAC-e PDU, it determines whether the MAC-e PDU includes a TPS based on a MAC-e signaling indicator bit set in the MAC-e PDU. In the presence of the TPS, the Node B 1101 extracts the TPS from the MAC-e PDU and uses the TPS in scheduling.

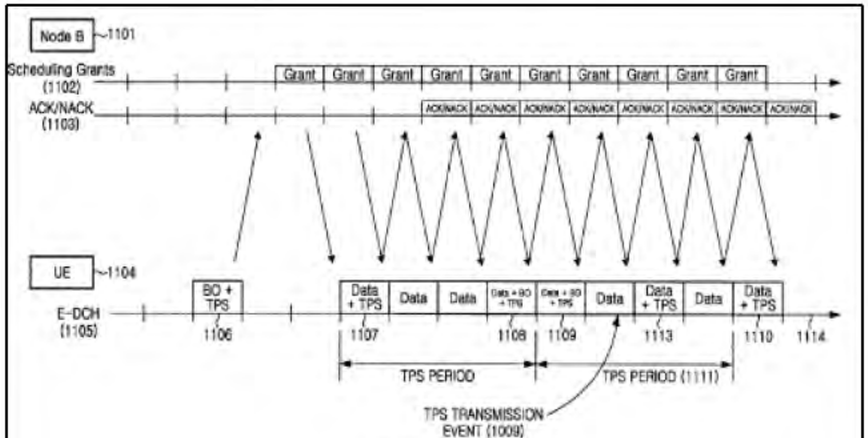


FIG.11

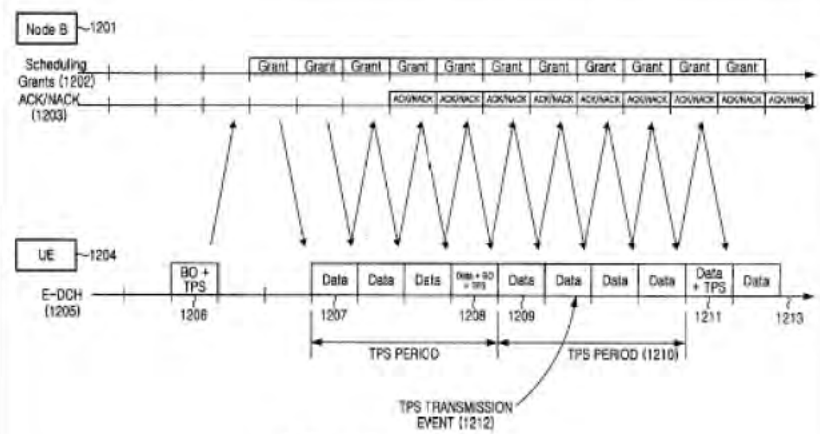
Id. at [0092-0102].

FIG. 12 illustrates periodic event-triggered TPS transmission from a UE for E-DCH scheduling according to a fifth exemplary embodiment of the present invention.

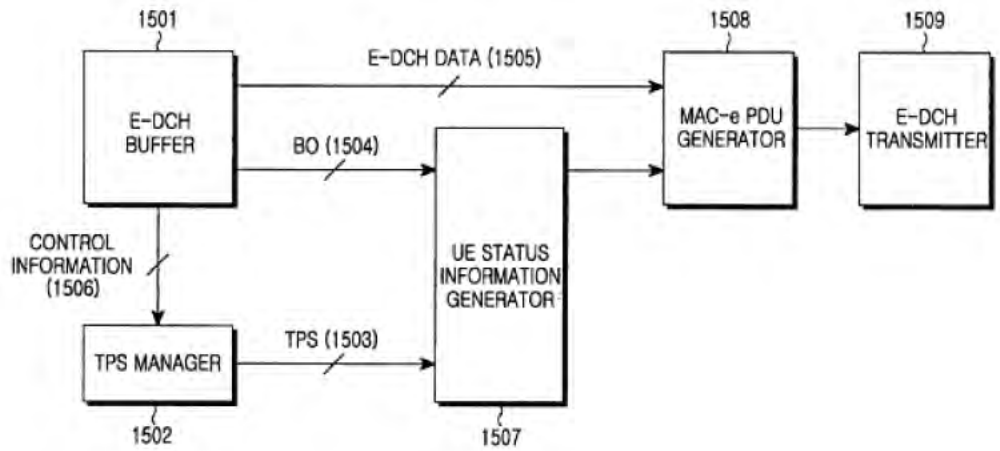
The UE monitors a predetermined TPS period. Only when a predetermined event is fulfilled upon expiration of the TPS period, the UE transmits a TPS. When the TPS period has expired and the event has occurred, in the presence of E-DCH data, the TPS is transmitted along with the E-DCH data in a

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	MAC-e PDU. In the absence of E-DCH data, the MAC-e PDU contains only the TPS. Referring to FIG. 12, when new data is buffered, a UE 1204 first transmits a BO & TPS 1206 in an initial MAC-e PDU to a Node B 1201 on an E-DCH 1205. The initial MAC-e PDU includes only the BO or/and TPS in a MAC-e header with no data in payload and is transmitted by MAC-e signaling. . . . The UE 1204 transmits the E-DCH data based on the scheduling grant information and the ACK/NACK signal. In accordance with the fifth exemplary embodiment of the present invention, the UE 1204 determines whether the event has occurred in time intervals 1207, 1209 and 1211 defined by the TPS period 1210 and transmits a TPS in the time interval 1211 for which the event is fulfilled. In the presence of E-DCH data, the UE 1204 transmits a TPS in the MAC-e header of a MAC-e PDU with the E-DCH data. In the absence of E-DCH data, the UE 1204 transmits a MAC-e PDU containing the TPS only. For instance, when the difference between the previous TPS and the current TPS exceeds a predetermined threshold, this is an event that triggers TPS transmission. The UE 1204 transmits the TPS in a MAC-e header in a transmission time interval following the event. The threshold is a predetermined fixed value or notified to the UE and the Node B from the RNC by RRC and NBAP upper signaling. Many other events that trigger TPS transmission can be defined. The TPS period 1210 is also a predetermined fixed value or notified to the UE and the Node B by RRC and NBAP upper signaling. In time intervals 1207, 1209 and 1211 each apart from the following time

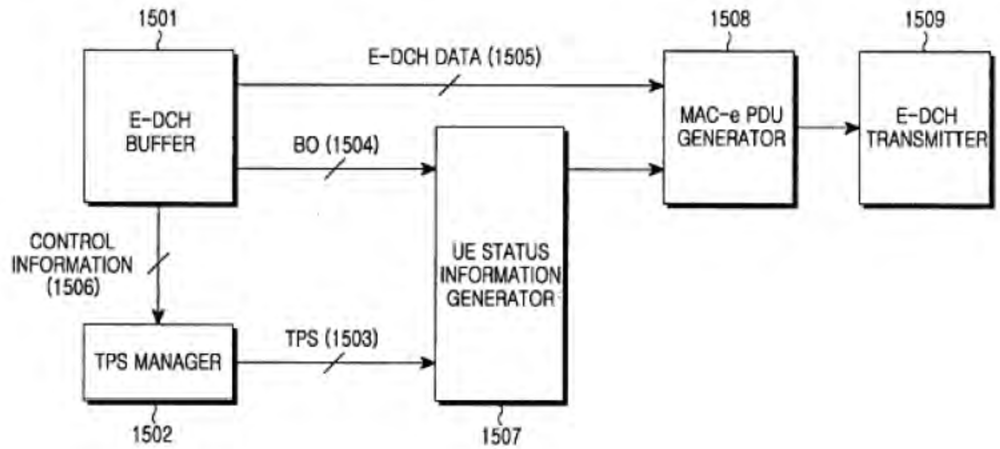
Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	interval by the TPS period 1210, the UE 1204 determines whether the event has occurred in the previous time interval. Upon occurrence of the event in a time interval 1212, the UE 1204 transmits a TPS in the following time interval 1211. In the time intervals 1207 and 1209, no TPSs are transmitted because the TPS period 1210 has expired but the event has not occurred. The time interval 1211 carrying the TPS is limited to the case where an ACK signal is received for the previous MAC-e PDU or the number of transmissions of the previous MAC-e PDU has reached a maximum allowed number in an HARQ process. In other words, a TPS can be transmitted only in a time interval in which an initial transmission is possible. Therefore, all conditions considered, the UE 1104 transmits a TPS in the MAC-e header of an initial transmission MAC-e PDU in the earliest time interval when the TPS period 1210 has expired after occurrence of the event. In a BO transmission time interval 1208, a TPS can also be transmitted in a MAC-e header even though the TPS period 1210 has expired in the BO transmission time interval 1208 after the event occurred. Before a time interval 1207, that is, before E-DCH data transmission, no TPSs are transmitted irrespective of the TPS period 1210 and the event, except a first BO transmission period 1206 indicating the start of the E-DCH data transmission. In the time interval 1206, the TPS and the BO are transmitted together. When there is no need for transmitting E-DCH data any longer, that is, when the buffer is empty in the UE 1204, the UE 1204 discontinues the E-DCH data transmission as indicated by reference numeral 1213. Every time the Node B 1201 receives a MAC-e PDU, it determines whether the MAC-e PDU includes a TPS based on a MAC-e signaling indicator bit set in the MAC-e PDU. In the presence of the TPS, the Node B 1101

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	extracts the TPS from the MAC-e PDU and uses the TPS in scheduling.  FIG.12 *Id.* at [0104-0114].
19. An apparatus comprising:	
[19a] at least one processor; and	"Referring to FIG. 1, a UTRAN 12 includes Radio Network Controllers (RNCs) 16 a and 16 b and Node Bs 18 a to 18 d and connects a UE 20 to a Core Network (CN) 10. A plurality of cells may underlie the Node Bs 18 a to 18 d. Each RNC 16 a or 16 b controls its underlying Node Bs and each Node B controls its underlying cells. An RNC, and Node Bs and cells under the control of the RNC collectively form a Radio Network Subsystem (RNS) 14 a or 14 b." Ex. 1005 at [0007]; Fig. 1. An exemplary object of the present invention is to transmit the TPS of a UE

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	to a Node B. The TPS is expressed as the maximum transmit power of the UE or the transmit power of a control channel alone from the UE. Alternatively, TPS is expressed as a maximum data rate available to the UE or a TF. Alternatively, the uplink transmit power information can be the ratio of the maximum transmit power to the transmit power of the control channel, that is, the power margin of the UE. In this context, the TPS represents the uplink channel status of the UE. The TPS is transmitted to the Node B by MAC information in the exemplary embodiments of the present invention. As implied from its appellation, the MAC layer is responsible for medium access control between the RLC layer and the PHY layer. With the introduction of the E-DCH, the MAC layer configuration illustrated in FIG. 2 has been modified so that for the E-DCH functionality, a MAC-e entity is newly defined to work in conjunction with the existing MAC-d entity configured for a Dedicated CHannel (DCH). The MAC-e entity exists between the MAC-d entity and the PHY layer. As data is processed in the MAC layer, its format is changed as illustrated in FIG. 5. *Id.* at [0051-52] With reference to FIG. 6, a UE operation for generating data in the procedure illustrated in FIG. 5 will be described below. Referring to FIG. 6, upon receipt of an RLC PDU 601, a MAC-d entity 602 generates a MAC-d PDU by adding a MAC-d header to the RLC PDU 601. A MAC-e entity 603 creates a MAC-e PDU by adding a MAC-e header to the MAC-d PDU. The MAC-e PDU is delivered to a PHY layer 604, is subject to transport channel processing including an HARQ operation, and is mapped to a PHY channel. The PHY channel is then transmitted as indicated by reference numeral 605. All this procedure illustrated in FIG. 6 is carried out in one UE 610.

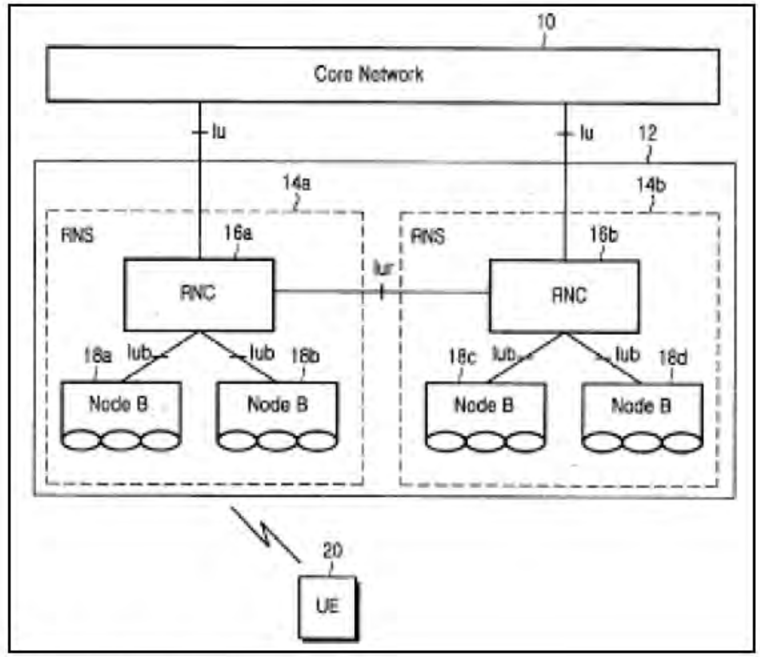
Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	Id. at [0056-57].  FIG.15 *Id.* at Fig. 15 FIG. 15 is a block diagram of a UE for TPS transmission according to an exemplary embodiment of the present invention. *Id.* at [0049]
[19b] at least one memory including software, where the at least one memory and the software are configured, with the at least one processor, to cause the apparatus to at least:	"Referring to FIG. 1, a UTRAN 12 includes Radio Network Controllers (RNCs) 16 a and 16 b and Node Bs 18 a to 18 d and connects a UE 20 to a Core Network (CN) 10. A plurality of cells may underlie the Node Bs 18 a to 18 d. Each RNC 16 a or 16 b controls its underlying Node Bs and each Node B controls its underlying cells. An RNC, and Node Bs and cells under

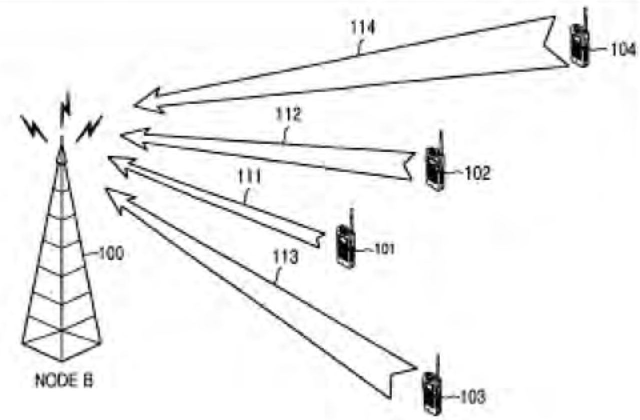
Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	the control of the RNC collectively form a Radio Network Subsystem (RNS) 14 a or 14 b." Ex. 1005 at [0007]; Fig. 1. An exemplary object of the present invention is to transmit the TPS of a UE to a Node B. The TPS is expressed as the maximum transmit power of the UE or the transmit power of a control channel alone from the UE. Alternatively, TPS is expressed as a maximum data rate available to the UE or a TF. Alternatively, the uplink transmit power information can be the ratio of the maximum transmit power to the transmit power of the control channel, that is, the power margin of the UE. In this context, the TPS represents the uplink channel status of the UE. The TPS is transmitted to the Node B by MAC information in the exemplary embodiments of the present invention. As implied from its appellation, the MAC layer is responsible for medium access control between the RLC layer and the PHY layer. With the introduction of the E-DCH, the MAC layer configuration illustrated in FIG. 2 has been modified so that for the E-DCH functionality, a MAC-e entity is newly defined to work in conjunction with the existing MAC-d entity configured for a Dedicated CHannel (DCH). The MAC-e entity exists between the MAC-d entity and the PHY layer. As data is processed in the MAC layer, its format is changed as illustrated in FIG. 5. *Id.* at [0051-52] With reference to FIG. 6, a UE operation for generating data in the procedure illustrated in FIG. 5 will be described below. Referring to FIG. 6, upon receipt of an RLC PDU 601, a MAC-d entity 602 generates a MAC-d PDU by adding a MAC-d header to the RLC PDU 601. A MAC-e entity 603 creates a MAC-e PDU by adding a MAC-e header to

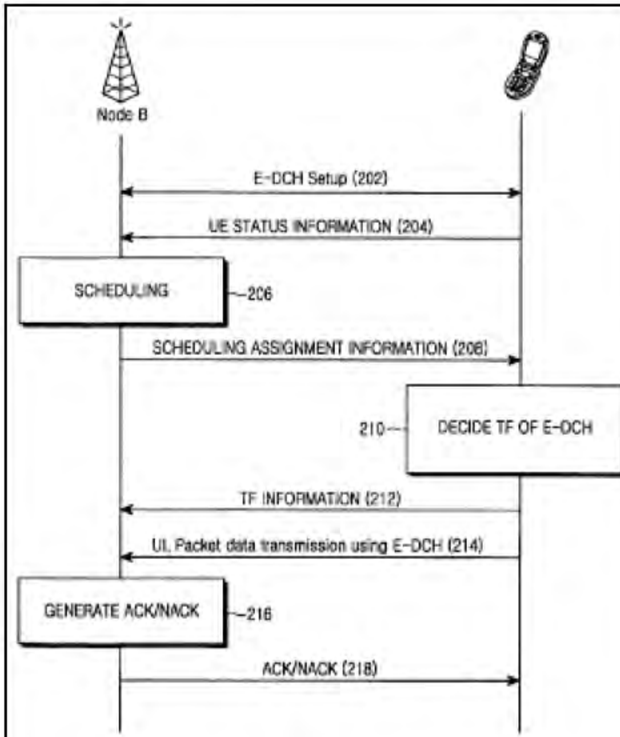
Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	the MAC-d PDU. The MAC-e PDU is delivered to a PHY layer 604, is subject to transport channel processing including an HARQ operation, and is mapped to a PHY channel. The PHY channel is then transmitted as indicated by reference numeral 605. All this procedure illustrated in FIG. 6 is carried out in one UE 610. *Id.* at [0056-57].  FIG.15 *Id.* at Fig. 15 FIG. 15 is a block diagram of a UE for TPS transmission according to an exemplary embodiment of the present invention. *Id.* at [0049]
[19c] determine that a set of at least one triggering criterion is met;	*See* Element [1a].

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
and	
[19d] provide a power control headroom report on an uplink from user equipment, in response to the set having been met,	*See* Element [1b].
[19e] wherein said at least one triggering criterion include at least one threshold having been reached,	*See* Element [1c].
[19f] wherein said at least one threshold is adjustable via a signal to the apparatus,	*See* Element [1d].
[19g] wherein the set of at least one triggering criterion comprises a criterion being met based on reaching a threshold of the at least one threshold of k transmission time intervals following a previous power control headroom report, wherein k is an integer and wherein said at least one threshold adjustable via the signal comprises adjusting the threshold integer k.	*See* Element [1e].
33. A network element comprising:	
[33a] at least one processor; and	Referring to FIG. 1, a UTRAN 12 includes Radio Network Controllers (RNCs) 16 a and 16 b and Node Bs 18 a to 18 d and connects a UE 20 to a

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	Core Network (CN) 10. A plurality of cells may underlie the Node Bs 18 a to 18 d. Each RNC 16 a or 16 b controls its underlying Node Bs and each Node B controls its underlying cells. An RNC, and Node Bs and cells under the control of the RNC collectively form a Radio Network Subsystem (RNS) 14 a or 14 b. The RNCs 16 a and 16 b each allocate or manage radio resources to the Node Bs 18 a to 18 d under their control and the Node Bs 18 a to 18 d function to actually provide the radio resources. The radio resources are configured on a cell basis and the radio resources provided by the Node Bs 18 a to 18 d refer to radio resources of the cells that they manage. The UE establishes a radio channel using radio resources provided by a particular cell under a particular Node B, for communications. From the UE's point of view, a distinction between the Node Bs 18 a to 18 d and their controlled cells is meaningless and the UE 20 deals only with a physical layer configured on a cell basis. Therefore, the terms "Node B" and "cell" are interchangeably used herein.

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	 Ex. 1005 at [0007-08]; Fig. 1. Referring to FIG. 4, a Node B and a UE establish an E-DCH in step 202. Step 202 involves message transmission on dedicated transport channels. The UE transmits its UE status information to the Node B in step 204. The UE status information may contain information about the transmit power and power margin of the UE and the amount of buffered data to be transmitted to the Node B. In step 206, the Node B monitors UE status information from a plurality of UEs to schedule uplink data transmissions for the individual UEs. The Node B decides to approve an uplink packet transmission from the UE and transmits scheduling assignment information to the UE in step 208. The scheduling assignment information includes an allowed data rate and an

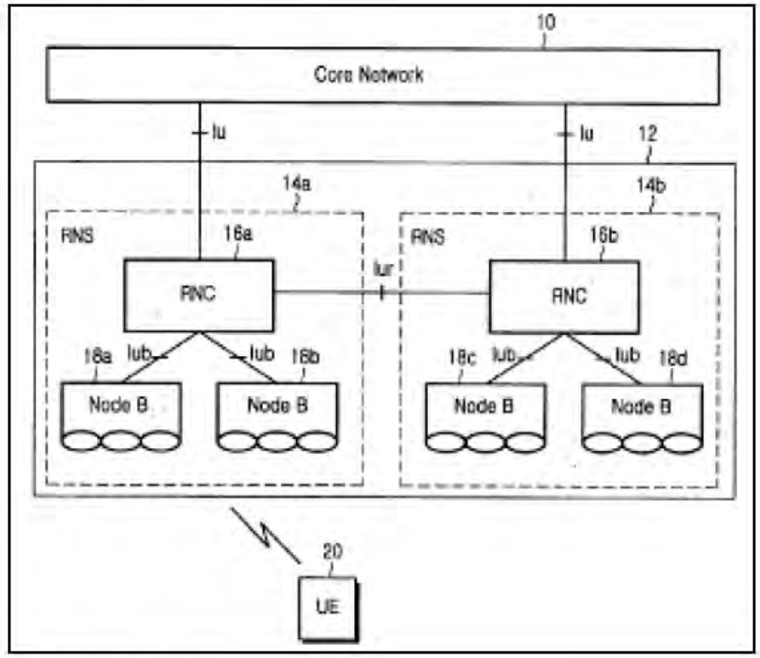
Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	allowed timing.  FIG.3 (PRIOR ART)

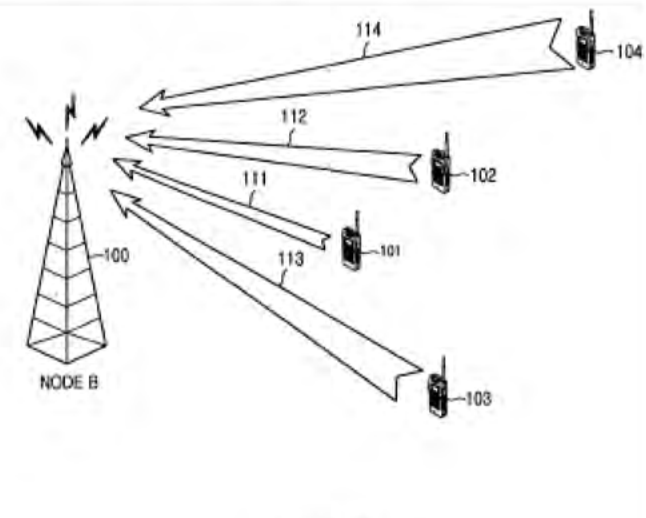
Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	 FIG.4 (PRIOR ART) *Id.* at [0020-21]; Fig. 4; *see also* Figs. 2-3. As described above, the UE needs to transmit its UE status information to the Node B, to assist E-DCH scheduling. Particularly, the uplink transmit power information included in the UE status information is a significant factor in scheduling. Accordingly, a need exists for specifying how the uplink transmit power information is to be transmitted for efficient E-DCH

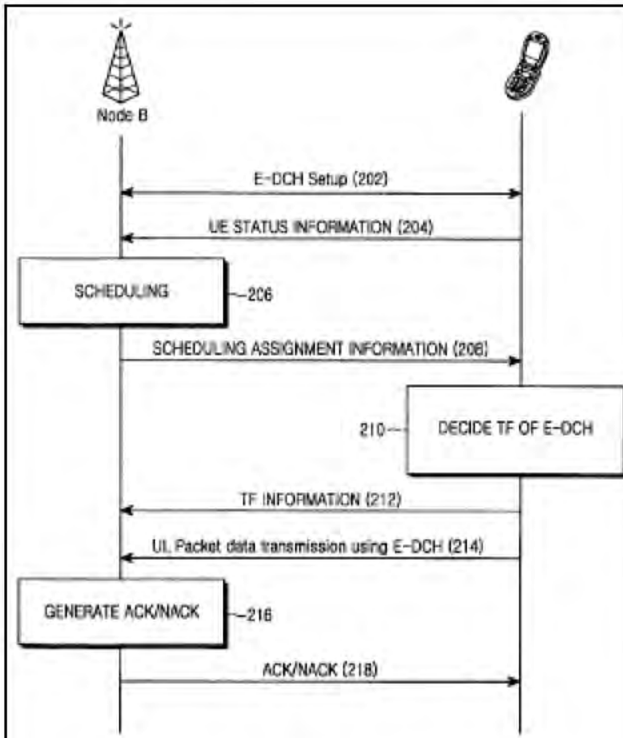
Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	transmission. SUMMARY OF THE INVENTION An object of the present invention is to address at least the above problems and/or disadvantages. Accordingly, an object of the present invention is to provide a method and apparatus for transmitting information about the uplink transmit power of a UE to a Node B for use in uplink data transmission scheduling in the Node B. *Id.* at [0024-25] An exemplary object of the present invention is to transmit the TPS of a UE to a Node B. The TPS is expressed as the maximum transmit power of the UE or the transmit power of a control channel alone from the UE. Alternatively, TPS is expressed as a maximum data rate available to the UE or a TF. Alternatively, the uplink transmit power information can be the ratio of the maximum transmit power to the transmit power of the control channel, that is, the power margin of the UE. In this context, the TPS represents the uplink channel status of the UE. The TPS is transmitted to the Node B by MAC information in the exemplary embodiments of the present invention. As implied from its appellation, the MAC layer is responsible for medium access control between the RLC layer and the PHY layer. With the introduction of the E-DCH, the MAC layer configuration illustrated in FIG. 2 has been modified so that for the E-DCH functionality, a MAC-e entity is newly defined to work in conjunction with the existing MAC-d entity configured for a Dedicated CHannel (DCH). The MAC-e entity exists between the MAC-d entity and the PHY layer. As data is processed in the MAC layer, its format is changed as illustrated in FIG. 5.

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	Id. at [0051-52] The information needed for the Node B 701 set in the MAC-e header contains UE status information. The UE status information has buffer information indicating the amount of uplink data to be transmitted (hereinafter, referred to as BO short for Buffer Occupancy), and uplink channel status information (hereinafter, referred to as TPS short for Transmit Power Status). Transmission of the BO is periodic or event-triggered. Events that trigger the BO transmission include input of new data in an E-DCH buffer and the amount of buffered data exceeding a threshold. It is assumed herein that a BO transmission method is predetermined. The UE uses a MAC-e PDU to transmit the TPS. Specifically, the UE transmits the TPS in the MAC-e header 506 on the E-DCH. Besides the BO, the TPS is required for Node B-controlled scheduling, as stated before. The Node B interprets a TPS set in the MAC-e header of a received MAC-e PDU and transmits a MAC-e PDU with the TPS or a MAC-e PDU free of the TPS (i.e. a MAC-es PDU) to the MAC-es entity of the RNC. Transmission of control information like the BO or the TPS by a MAC-e header is called MAC-e signaling in the present invention. *Id.* at [0062-0064] After receiving an initial MAC-e PDU containing a BO and a TPS only, the Node B 1101 extracts the TPS from the first MAC-e PDU including data. Then, the Node B 1104 extracts a TPS from a MAC-e PDU received every TPS period 1111. Also, every time the Node B 1101 receives a MAC-e PDU, it determines whether the MAC-e PDU includes a TPS based on a MAC-e signaling indicator bit set in the MAC-e PDU. In the presence of the TPS, the Node B 1101 extracts the TPS from the MAC-e PDU and uses the

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	TPS in scheduling. *Id.* at [0102]. Every time the Node B 1201 receives a MAC-e PDU, it determines whether the MAC-e PDU includes a TPS based on a MAC-e signaling indicator bit set in the MAC-e PDU. In the presence of the TPS, the Node B 1101 extracts the TPS from the MAC-e PDU and uses the TPS in scheduling. *Id.* at [0114].
[33b] at least one memory including software, where the at least one memory and the software are configured, with the at least one processor, to cause the network element to at least:	Referring to FIG. 1, a UTRAN 12 includes Radio Network Controllers (RNCs) 16 a and 16 b and Node Bs 18 a to 18 d and connects a UE 20 to a Core Network (CN) 10. A plurality of cells may underlie the Node Bs 18 a to 18 d. Each RNC 16 a or 16 b controls its underlying Node Bs and each Node B controls its underlying cells. An RNC, and Node Bs and cells under the control of the RNC collectively form a Radio Network Subsystem (RNS) 14 a or 14 b. The RNCs 16 a and 16 b each allocate or manage radio resources to the Node Bs 18 a to 18 d under their control and the Node Bs 18 a to 18 d function to actually provide the radio resources. The radio resources are configured on a cell basis and the radio resources provided by the Node Bs 18 a to 18 d refer to radio resources of the cells that they manage. The UE establishes a radio channel using radio resources provided by a particular cell under a particular Node B, for communications. From the UE's point of view, a distinction between the Node Bs 18 a to 18 d and their controlled cells is meaningless and the UE 20 deals only with a physical layer configured on a cell basis. Therefore, the terms "Node B" and "cell" are

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	interchangeably used herein.  Ex. 1005 at [0007-08]; Fig. 1. Referring to FIG. 4, a Node B and a UE establish an E-DCH in step 202. Step 202 involves message transmission on dedicated transport channels. The UE transmits its UE status information to the Node B in step 204. The UE status information may contain information about the transmit power and power margin of the UE and the amount of buffered data to be transmitted to the Node B. In step 206, the Node B monitors UE status information from a plurality of UEs to schedule uplink data transmissions for the individual UEs. The Node B decides to approve an uplink packet transmission from the UE and transmits scheduling assignment information to the UE in step 208. The

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	scheduling assignment information includes an allowed data rate and an allowed timing.  FIG.3 (PRIOR ART)

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	 FIG.4 (PRIOR ART) *Id.* at [0020-21]; Fig. 4; *see also* Figs. 2-3. As described above, the UE needs to transmit its UE status information to the Node B, to assist E-DCH scheduling. Particularly, the uplink transmit power information included in the UE status information is a significant factor in scheduling. Accordingly, a need exists for specifying how the uplink transmit power information is to be transmitted for efficient E-DCH

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	transmission. SUMMARY OF THE INVENTION An object of the present invention is to address at least the above problems and/or disadvantages. Accordingly, an object of the present invention is to provide a method and apparatus for transmitting information about the uplink transmit power of a UE to a Node B for use in uplink data transmission scheduling in the Node B. *Id.* at [0024-25] An exemplary object of the present invention is to transmit the TPS of a UE to a Node B. The TPS is expressed as the maximum transmit power of the UE or the transmit power of a control channel alone from the UE. Alternatively, TPS is expressed as a maximum data rate available to the UE or a TF. Alternatively, the uplink transmit power information can be the ratio of the maximum transmit power to the transmit power of the control channel, that is, the power margin of the UE. In this context, the TPS represents the uplink channel status of the UE. The TPS is transmitted to the Node B by MAC information in the exemplary embodiments of the present invention. As implied from its appellation, the MAC layer is responsible for medium access control between the RLC layer and the PHY layer. With the introduction of the E-DCH, the MAC layer configuration illustrated in FIG. 2 has been modified so that for the E-DCH functionality, a MAC-e entity is newly defined to work in conjunction with the existing MAC-d entity configured for a Dedicated CHannel (DCH). The MAC-e entity exists between the MAC-d entity and the PHY layer. As data is processed in the MAC layer, its format is changed as illustrated in FIG. 5.

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	Id. at [0051-52] The information needed for the Node B 701 set in the MAC-e header contains UE status information. The UE status information has buffer information indicating the amount of uplink data to be transmitted (hereinafter, referred to as BO short for Buffer Occupancy), and uplink channel status information (hereinafter, referred to as TPS short for Transmit Power Status). Transmission of the BO is periodic or event-triggered. Events that trigger the BO transmission include input of new data in an E-DCH buffer and the amount of buffered data exceeding a threshold. It is assumed herein that a BO transmission method is predetermined. The UE uses a MAC-e PDU to transmit the TPS. Specifically, the UE transmits the TPS in the MAC-e header 506 on the E-DCH. Besides the BO, the TPS is required for Node B-controlled scheduling, as stated before. The Node B interprets a TPS set in the MAC-e header of a received MAC-e PDU and transmits a MAC-e PDU with the TPS or a MAC-e PDU free of the TPS (i.e. a MAC-es PDU) to the MAC-es entity of the RNC. Transmission of control information like the BO or the TPS by a MAC-e header is called MAC-e signaling in the present invention. *Id.* at [0062-0064] After receiving an initial MAC-e PDU containing a BO and a TPS only, the Node B 1101 extracts the TPS from the first MAC-e PDU including data. Then, the Node B 1104 extracts a TPS from a MAC-e PDU received every TPS period 1111. Also, every time the Node B 1101 receives a MAC-e PDU, it determines whether the MAC-e PDU includes a TPS based on a MAC-e signaling indicator bit set in the MAC-e PDU. In the presence of the TPS, the Node B 1101 extracts the TPS from the MAC-e PDU and uses the

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
	TPS in scheduling. *Id.* at [0102]. Every time the Node B 1201 receives a MAC-e PDU, it determines whether the MAC-e PDU includes a TPS based on a MAC-e signaling indicator bit set in the MAC-e PDU. In the presence of the TPS, the Node B 1101 extracts the TPS from the MAC-e PDU and uses the TPS in scheduling. *Id.* at [0114].
[33c] receive a power control headroom report on an uplink from user equipment, in response to the user equipment determining that a set of at least one triggering criterion is met because at least one threshold has been reached,	*See* Element [1b, 1c]
[33d] wherein the set of at least one triggering criterion comprises a criterion being met based on reaching a threshold of the at least one threshold of k transmission time intervals following a previous power control headroom report,	*See* Element [1e]
[33e] wherein k is an integer and wherein said at least one threshold adjustable via the signal comprises adjusting the	*See* Element [1d, 1f]

Challenged Claim of the '676	Disclosure in Kwak (Ex. 1005)
threshold integer k; and	
[33f] provide a threshold adjustment signal to the user equipment in order to adjust the at least one threshold.	*See* Element [1d].