

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AT&T MOBILITY LLC, AT&T SERVICES INC., ERICSSON INC., NOKIA OF
AMERICA CORPORATION, T-MOBILE USA, INC
Petitioners,

v.

DAINGEAN TECHNOLOGIES LTD.,
Patent Owner.

Case No. IPR2024-00310
U.S. Patent No. 10,932,207

DECLARATION OF DR. MARK MAHON

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I, Dr. Mark Mahon, declare as follows:

I. INTRODUCTION

1. I have been retained by Petitioners and their counsel, McKool Smith P.C. (“McKool Smith”), as an independent expert consultant in this proceeding regarding U.S. Patent No. 10,932,207 (“the ’207 Patent”) (EX. 1001). I have been asked to consider whether certain references disclose or suggest the limitations recited in claims 4–6 and 8 of the ’207 Patent (“the Challenged Claims”).

2. I am being compensated for my work in this proceeding at a rate of \$500 per hour and receiving reimbursement for expenses incurred in the course of my work. My compensation is in no way contingent on the nature of my findings, the presentation of my findings in testimony, or the outcome of this or any other proceeding. I have no other interest in this proceeding.

3. This declaration is directed to the Challenged Claims of the ’207 Patent and sets forth certain opinions I have formed, the conclusions I have reached, and the bases for each. The conclusions I present are based on my own judgment. I am not an employee of the Petitioners, McKool Smith, the inventors of the ’207 Patent, or of any affiliated companies.

4. Based on my experience, knowledge of the art at the relevant time, and analysis of prior art references, it is my opinion that the Challenged Claims of the ’207 Patent are unpatentable over the prior art references discussed below.

II. QUALIFICATIONS

A. Overview

5. I am a Teaching Professor in the School of Electrical Engineering and Computer Science at Pennsylvania State University, University Park, PA (“Penn State” or “PSU”). I have worked on telecommunications networks, including AMPS, IS-95, CDMA2000, GSM, EDGE, UMTS/WCDMA, LTE, and 5G cellular systems since 1988.

6. I received my B.S. in Electronics Engineering from the University of Scranton in 1987. I received my M.S. in Electrical Engineering and Ph.D. in Acoustics from Penn State in 1991 and 2001, respectively.

7. In 1988, after I received my bachelor’s degree, I joined the Central Intelligence Agency (CIA) while pursuing my M.S. degree at Penn State part-time. My first job at the CIA involved designing and testing systems to automatically capture and characterize telecommunication signals and emissions from various computer networking devices.

8. I returned to Penn State in early 1990 to pursue graduate research full-time and complete my M.S. degree. My graduate research work focused on wideband beamforming and adaptive signal processing. After completing my M.S. degree in EE in 1991, I accepted a full-time faculty research position at the Applied Research Lab at PSU, primarily working on classified programs, and I began

working on diverse radio frequency and acoustic sensor systems including wireless communications and small wireless networks for acoustic tracking, source localization, and feature extraction.

9. I began pursuing my Ph.D. part-time in 1993 while continuing my faculty research position. In 1997, as part of my faculty research position, I began working on classified programs focused on mathematical analytical modeling of cellular communication networks and the development of hardware and software systems to test against cellular networks. My role was to develop the algorithms and write the code running on a specially developed embedded system. For this work, I received a letter of recognition as the “genius behind the VELA software algorithms” from the Director of National Reconnaissance Office (NRO) Systems Engineering and Technology Office. As part of this same work, I was extensively involved in protocol and signaling analysis as well as researching model-specific performance and unique functional characteristics associated with individual mobile devices. The work involved testing dozens of handsets from many manufacturers in controlled and real-world environments against network simulators and live operational networks for each research project.

10. In 2000 my research extended into utilizing non-orthogonal wavelets for improving detection and localization of cellular handsets from high altitude sensor systems. In 2001, I completed my Ph.D., and my research focused on the

utilization of advanced communication signals for wideband characterization and remote sensing of propagation channels.

11. Beginning in 1997 my cellular communications research work focused on CDMA, GSM, EDGE, UMTS, LTE, and 5G cellular systems primarily under grants sponsored principally by the Department of Defense. This classified research work required 3GPP protocol analysis and development of real-time embedded hardware and software systems capable of interacting with cellular networks and cellular handsets. A large portion of my work was directed at architectures, protocols, software, and signaling.

12. I have been working on classified projects since 1988. Before 1998, because the work was not deemed highly classified, I was able to publish eight journal and conference papers. Between 1999 and 2015, I published and presented about a dozen articles in classified settings, but I was only permitted to publish one article in an unclassified symposium. This is because during this period, the vast majority of my research was highly classified. As a result, nearly all of my research results were summarized in classified reports and not available to the general public. Further, because the U.S. government owns any intellectual property resulting from the sponsored research work, I did not pursue or file patent applications.

13. In 2015, I transferred to the School of Electrical Engineering and Computer Science at Penn State as a teaching faculty member. In that role, I have

continued teaching graduate and undergraduate courses, guiding Ph.D. and M.S. students in communication and mobile networking (including LTE and 5G cellular networks), and pursuing research in this and related areas. Since 2015, I have been an author on seven refereed papers as listed in my curriculum vitae (CV) (attached as Exhibit A).

14. Because of my decades of research and my continuing work at Penn State, I have intimate knowledge of telecommunication networks, including the technology involved in the patents in this case. I have been highly recognized as an expert in such systems within the research community. I was recognized twice by the National Reconnaissance Office with commendation letters for work dealing with detecting cellular signals in low signal to noise ratio environments. The U.S. government awarded me over \$12M in grants between 2003 and 2015 for projects focused on mobile communication devices and networks, in which I served as a Principal Investigator (PI), Co- PI, and/or technical lead.

15. Additionally, during my research career, I interacted extensively with computer scientists and engineers responsible for the design, development, and testing of telephony and data networking systems and testbeds. As a research faculty member, I oversaw engineers and computer scientists that executed many joint projects with development organizations. These interactions exposed me to a wide range of computer scientists and engineers working on telecommunication network

technologies. Since 2011, I have been teaching undergraduate and graduate classes in communication and mobile networking and am familiar with the curricula being taught to electrical engineers and computer scientists. The interactions with a wide range of computer scientists and engineers working on telecommunication network technologies and the familiarity with the classes taught to electrical engineers and computer scientists have allowed me to have a good understanding of the level of skills possessed by a person of ordinary skill in the field of cellular technology.

B. Experience with Cellular Networks

16. I have extensive experience with mobile networks in general and LTE and 5G specifically. While most of my research efforts between 1998 and 2015 are highly classified, I can state that they included detailed investigation of network architectures, signaling, and functional behavior. A typical research effort would involve studying 3GPP, 3GPP2, IEEE, and other protocol standards to fully comprehend all aspects of L1, L2, and L3 requirements including timing, bit-level construction of the control and user plane messages, and timing characteristics for a given standard as well as functional behavior of network components and user equipment.

17. From 2006 through 2015 my research focused specifically on LTE. My research continues to this day, although I am no longer operating in a classified environment. During this time, I investigated the performance and functional

differences of many varied network and handset devices to see how differing signaling and environmental factors influenced the behavior of user equipment in a given network environment. This included how synchronization, timing, and signal to interference plus noise ratio (SINR) for a given device would affect specific functional aspects including elements of the receiver structure, decoding and demodulation performance, calculation of parameters used by the device for making decisions and deriving parameters reported to the network.

18. As part of my research work, I built several custom CDMA, GSM, UMTS, and LTE platforms that implemented specific network-side and user equipment-side functionality including custom signal generation and processing structures, particularly the signal processing chains on both the transmit and receive sides. This equipment was developed using network simulation hardware in a laboratory environment and was later tested with corresponding networks in both controlled and fully operational environments. Implementing the transmit and receive chains for custom built protocol-enabled equipment required me to gain an intimate understanding of the relevant 3GPP protocol specifications and the underlying structures. Since 2015, I have been primarily focused on guiding graduate students pursuing research into multiple-input multiple-output (MIMO) techniques to improve throughput in dense-user environments, optimized distributed

processing algorithms, and the implementation of block chain coding techniques to improve handover security in 4G (LTE)/5G (NR) networks.

III. MATERIALS REVIEWED AND CONSIDERED

19. My findings contained in this declaration are based on my education, research, experience, and background in the field of computer and communication networks, and specifically, in relation to wireless communication systems, as well as on my investigation and study of prior art references and other documents disclosed in this declaration, including the following:

Exhibit No.	Description
1001	U.S. Patent 10,932,207 (“’207 Patent”)
1002	Prosecution History of U.S. Patent 10,932,207 (“’207 File History”)
1003	Declaration of Mark Mahon, Ph.D. (“Mahon Declaration”)
1004	Curriculum Vitae of Mark Mahon, Ph.D.
1005	US Patent Publication No. 2017/0019930 (“Lee1”)
1006	US Patent Publication No. 2010/0255847 (“Lee2”)
1007	Dahlamn et al. 4G, LTE-ADVANCED PRO AND THE ROAD TO 5G (3rd ed. 2016)
1008	Harri Holma and Antti Toskala LTE FOR UMTS (2009)
1009	Nokia, “Considerations on NR RACH procedures,” R2-168013 (Nov. 2016)
1010	3GPP TS 36.331 V13.0.0 (2016) (“TS 36.331”)
1011	3GPP TS 25.214 v3.2.0 (March 2000) (“TS 25.214 Release 1999”)
1012	3GPP TS 38.321 v16.1.0

IV. MY UNDERSTANDING OF CERTAIN PATENT LAW PRINCIPLES

20. As a technical expert, I am not offering any legal opinions. Rather I am offering technical assessments and opinions. In rendering my analysis, I have been

informed by counsel regarding various legal standards for determining patentability. I have applied those standards in forming my technical opinions expressed in this declaration.

21. I understand that in this proceeding, Petitioners have the burden of proving that the Challenged Claims are invalid by a preponderance of the evidence. I understand that “preponderance of the evidence” means that a fact or conclusion is more likely true than not true.

22. The patent claims define the invention made by the inventors and define what the patent owner owns and what the owner may prevent others from using. I understand that an independent claim sets forth all the requirements that must be met to be covered by that claim. I further understand that a dependent claim does not itself recite all of the requirements of the claim but refers to another claim and incorporates all of the requirements of the claim to which it refers.

23. I understand that a claim in an issued patent is unpatentable as anticipated if the recited invention is described in a single prior-art reference that discloses each limitation, either expressly or inherently.

24. It is my understanding that a claimed invention is unpatentable 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 the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Obviousness, as

I understand it, is based on the scope and content of the prior art, the differences between the prior art and the claim, and the level of ordinary skill in the art.

25. I understand that under 35 U.S.C. § 103, “[a] patent for a claimed invention may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.”

26. I understand that a patent claim may be unpatentable as obvious over a single prior art reference or in view of a combination of prior art references. I understand that prior art references may also be combined with the knowledge of a person of ordinary skill in the art. I further understand that a person of ordinary skill in the art is presumed to know the relevant prior art. I understand that the obviousness analysis may take into account the inferences and creative steps that a person of ordinary skill in the art would employ.

27. I understand that when evaluating obviousness, one must not consider whether the claimed invention would have been obvious to a layman or to an expert; not use hindsight when comparing the prior art to the claimed invention; and not consider what was learned from the teachings of the patent. In particular, I understand that it is improper to use the patent claims as a road map for selecting

and combining items of prior art. In other words, one should avoid using the challenged patent as a guide through the prior art references, combining the right references in the right way so as to achieve the result of the claims at issue. Instead, one must put oneself in the place of a person of ordinary skill at the time the invention was made and consider only what was known before the invention was made.

28. I understand that obviousness should be considered in light of the problems known to the person having ordinary skill in the art at the relevant time and the complexity of the alternatives for solving the problem. That individual elements of the claimed invention are disclosed in the prior art is not alone sufficient to reach a conclusion of obviousness.

29. I also understand that when considering the obviousness of a patent claim, one must consider whether a teaching, suggestion, or motivation to combine the references exists so as to avoid impermissibly applying hindsight when considering the prior art. I understand that a teaching, suggestion, or motivation may be found explicitly or implicitly: (1) in the prior art; (2) in the knowledge of those of ordinary skill in the art; or (3) from the nature of the problem to be solved. I also understand that the legal determination of the motivation to combine references allows recourse to logic, judgment, and common sense, but that any such motivation to combine references must still avoid the improper application of hindsight or

reliance on the patentee's disclosure of his invention as found in the patent specification, drawings, and claims. In a similar vein, I understand that one should consider whether a person of ordinary skill in the art would have had a reasonable expectation of success in achieving the purported invention.

30. I further understand that certain factors may support or rebut the obviousness of a claim. I understand that such secondary considerations include, among other things, commercial success of the patented invention, skepticism of those having ordinary skill in the art at the time of the invention, unexpected results of the invention, any long-felt but unresolved need in the art that was satisfied by the alleged invention, the failure of others to make the alleged invention, praise of the alleged invention by those having ordinary skill in the art, and copying of the alleged invention by others in the field. I understand that there must be a nexus—a connection—between any such secondary considerations and the alleged invention. I also understand that contemporaneous independent invention by others is a secondary consideration tending to show obviousness.

31. I understand that in determining whether a prior art reference would have been combined with other prior art or with other information within the knowledge of a person of 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 in the same way;
- applying a known technique to a known device ready for improvement to yield predictable results;
- applying a technique or approach that would have been “obvious to try,” i.e., 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 one of ordinary skill in the art;
- numerical ranges disclosed in the prior art that overlap with numerical limitations set forth in the challenged claims;
- whether certain aspects of the patented subject matter were result-effective, such that a person of ordinary skill in the art would know that such element is determinative as to the effectiveness of the patent subject matter; and

- 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. I understand that this teaching, suggestion or motivation may come from prior art references or from the knowledge or common sense of one of ordinary skill in the art.

32. I have been informed by counsel that the Board construes claims according to the so-called “*Phillips*” standard. Under the *Phillips* standard, terms in a claim are given their ordinary and customary meaning, consistent with the patent’s specification, as understood by a POSITA. I have been informed by counsel that what is to be considered includes the claims, the patent specifications and drawings, and the prosecution history, including any art listed by the examiner or the Applicant. I have been informed by counsel that information external to the patent, including expert and inventor testimony and unlisted prior art, are to be considered if ambiguities remain.

V. LEVEL OF ORDINARY SKILL IN THE ART

33. It is my understanding that a person of ordinary skill in the art (“POSITA”) is a hypothetical person who analyzes the prior art without the benefit of hindsight. I have been instructed that the level of ordinary skill may be reflected by the prior art of record, and that a person of ordinary skill in the art to which the

claimed subject matter pertains would have the capability of understanding the scientific and engineering principles applicable to the pertinent art. I have been instructed that there are multiple factors that may be considered in determining the level of ordinary skill in the art, including: (1) type of problems encountered in the prior art; (2) prior art solutions to those problems; (3) rapidity with which innovations are made; (4) sophistication of the technology; and (5) educational level of active workers in the field. I also understand that a POSITA is also a person of ordinary creativity, not an automaton. They would be able to fit the teachings of multiple patents together like a puzzle and have the capability of understanding the scientific and engineering principles applicable to the pertinent art.

34. As stated in the '207 Patent, the “Technical Problem” to which the alleged invention is directed is providing “a terminal apparatus capable of efficiently performing a random access to a base station apparatus, a base station apparatus communicating with the terminal apparatus, a communication method used for the terminal apparatus, a communication method used for the base station apparatus, an integrated circuit implemented on the terminal apparatus, and an integrated circuit implemented on the base station apparatus.” Ex. 1001 at 1:53–61. In other words, the '207 Patent concerns systems and methods for performing a random access procedure in a wireless network.

35. I have been asked to provide a definition for the level or ordinary skill in the art for a POSITA in the field of the '207 Patent at the time the priority application for the '207 Patent was filed. To that end, I have been asked to assume for purposes of this declaration that the '207 Patent is entitled to claim priority to February 20, 2017, which corresponds to the filing date of JP2017-029042.

36. In my opinion, a POSITA in reference to the '207 Patent would possess (1) the equivalent of an undergraduate degree in Electrical Engineering, Computer Science, or Computer Engineering; and (2) at least two years of experience in design, development, and/or testing of cellular networks. In addition, a POSITA would also have familiarity with the wireless standards and well-known protocols for accessing wireless networks. It is also my opinion that this definition is flexible in the sense that additional education (*e.g.*, a PhD in Electrical Engineering, Computer Science, or Computer Engineering) could substitute for professional experience or *vice versa*.

37. I consider myself to have at least the credentials of a POSITA, and I am capable of addressing the issues from the perspective of such a person. As a result of my education, academic experience, and industrial experience, I am familiar with cellular networks, including the wireless standards on which they are based, and with the state of that technology on or around February 20, 2017.

38. All of my opinions in this declaration are from the perspective of a POSITA, as I have defined it above and during the relevant time frame.

VI. TECHNICAL BACKGROUND

A. Background Related to Random Access Procedure

39. As noted above, the '207 Patent claims priority to a Japanese patent application filed on February 20, 2017. At that time, 3GPP was preparing for the initial release of the technical specifications for 5G/NR wireless standards, which occurred in late 2017.

40. 3GPP did not start from scratch when it developed the 5G/NR wireless standard. Instead, 3GPP incorporated a variety of features that were introduced in earlier generations of wireless standards, such as 4G/LTE and 3G/WCDMA. One of these features is called random access procedure.

41. Although a single base station can service multiple mobile devices, total capacity is finite. Given this constraint on base station capacity, allocating network resources from each base station to every mobile device continuously is unfeasible. Instead, the allocation of network resources by a base station to a specific mobile device occurs only when the device requests such resources. From the perspective of the network, the timing of these requests is random because the network does not know when any given subscriber is going to need signaling resources. For this reason, mobile telecommunications systems support a “random access procedure” that enables mobile devices to connect to the network whenever they need to do so.

42. In 3G, 4G, and now 5G wireless standards, the mobile device begins the random access procedure by transmitting a random access preamble to the network over a shared channel (typically called the random access channel or “RACH”). As random access preambles are not scheduled, there is a potential for two or more requests to reach the base station simultaneously. In certain mobile telecommunication systems, this simultaneous arrival can lead to a “collision,” hindering the base station's ability to decipher the requests. To mitigate the probability of these collisions, a contention-based random access procedure is employed. For contention-based random access, which is the subject of this declaration, the base station broadcasts information the mobile device can use to derive a set of random access preambles that can be used to connect to the network via a particular cell. As an example, in LTE, up to 64 random access preambles are available for each cell.¹ When a mobile subscriber decides to initiate random access, the mobile device randomly selects one of the available preambles and transmits the preamble sequence over the RACH. By using this procedure, the base station can successfully decipher random access preambles that arrive simultaneously.

43. 3G and 4G wireless standards use a 4-step process for contention based random access. These steps are depicted below.

¹ See, e.g., Ex. 1007 (Dahlamn et al., 4G, LTE-ADVANCED PRO AND THE ROAD TO 5G (3rd ed. 2016)) at 298.

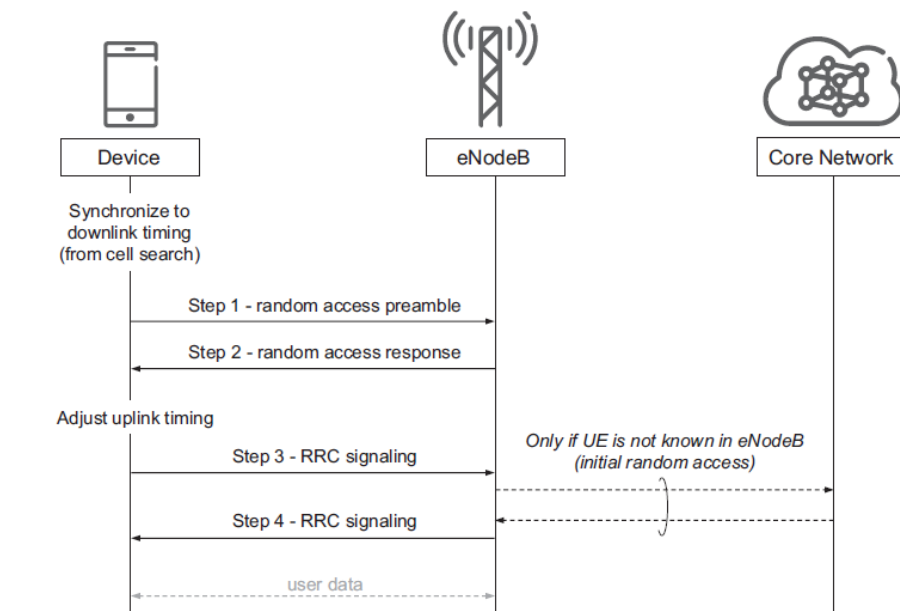


FIGURE 11.8

Overview of the random-access procedure.

Ex. 1007 at Fig. 11.8.

44. In addition to the conventional, 4-step procedure for contention based random access, technical proposals that would enable 2-step contention based random access were also considered by 3GPP. 3GPP ultimately adopted an optional 2-step random access procedure as part of the 5G standards. Ex. 1012 at 25–26. As the name implies, 2-step contention based random access combines steps 1 and 3 of the conventional 4-step procedure into a single step. In a similar vein, 2-step contention based random access merges the steps performed by the base station into a single step. This results in a random access procedure that is completed in just two steps.

45. Figures comparing 4-step and 2-step contention based random access are reproduced below.

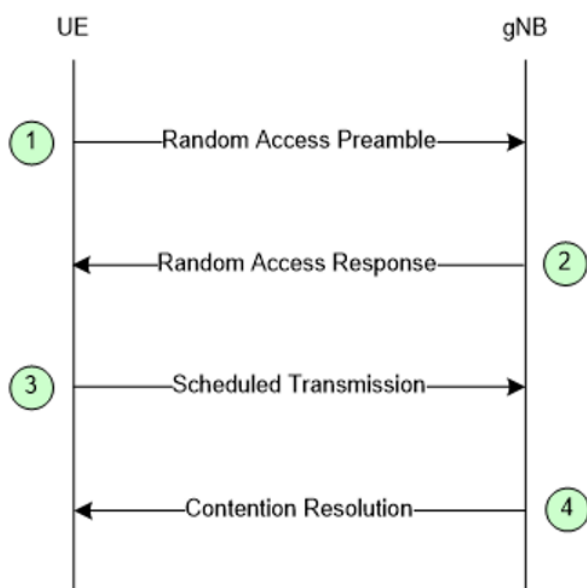


Figure 1: 4-step RACH procedure



Figure 3: 2-step RACH procedure

Ex. 1009 (Nokia, “Considerations on NR RACH procedures,” R2-168013 (Nov. 2016)) at 2. As shown above, in both 4-step and 2-step random access procedures, a mobile device initiates random access by transmitting a random access preamble to a gNB (*i.e.*, a base station).

B. Power Ramping

46. In wireless systems, power ramping during random access refers to the gradual adjustment of transmission power of the transmitted preamble during the initial stages of communication between a mobile device and a base station in particular instances when the UE needs to attach, re-synchronize, or send uplink data

and requires uplink resources. This process is essential for the mobile device to minimize interference and to establish a connection in a manner that is energy efficient. In LTE and 5G systems, the initial RACH transmission power is set, in part, by the base station to a value which typically results in a successful random access procedure. However, since the initial power level setting is “open loop,” it also requires the mobile device to include an estimate of the downlink path loss between the serving base station and itself, leading to potential first-attempt RACH failures. Additionally, considering that the path loss estimate is a coarse approximation and there is an additional unknown amount of uplink fading that must be accounted for, power ramping is required in LTE and 5G systems, even though PRACH resources are separate from other uplink channels (*e.g.*, PUSCH and PUCCH), to maximize the likelihood of simultaneous detection of distinct preamble sequences while minimizing interference on adjacent PUSCH and PUCCH resources from asynchronous PRACH transmissions. Power ramping also increases the likelihood of a device further from the base station successfully completing the random access procedure, while reducing the likelihood of a device closer to the base station interfering with other random access attempts given that it is not transmitting at a maximum power setting on its first attempt which as indicated above has a high likelihood of being successful.

47. During power ramping, the mobile device systematically increases the transmission power of the random access preamble for each unsuccessful random access attempt. As shown in the figure reproduced below, for the first attempt, the transmission power is set to an initial value. In some cases, the first transmission will succeed, which obviates the need to ramp up the transmission power. However, in other cases, the first transmission will fail. When this happens, the mobile device increases the transmission power of the random access preamble by a configurable step size (*i.e.*, a power ramping step) and attempts random access at the elevated transmissions power. The mobile device repeats this process until the random access attempt succeeds.

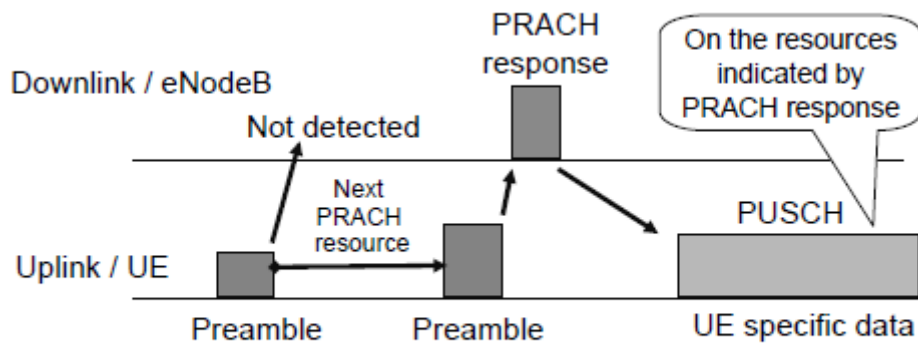


Figure 5.42 Power ramping in random access procedure

Ex. 1008 (Harri Holma and Antti Toskala LTE for UMTS (2009)) at Fig. 5.42.

48. The power ramping procedure described above has been part of wireless telecommunication standards for decades. For example, 3GPP TS 25.214 (March 2000) is a technical specification for physical layer procedures in the initial

release (referred to as Release 1999) of the 3G/WCMA standard. Ex. 1011 at Cover.

As shown below, the transmission power of random access preambles is given by, among other parameters, an initial transmission power defined by “Preamble_Initial_Power” and a power-ramping factor defined by “Power_Ramp_Step.”

6.1 Physical random access procedure

The physical random access procedure described in this subclause is initiated upon request of a PHY-Data-REQ primitive from the MAC sublayer (cf. TS 25.321).

Before the physical random-access procedure can be initiated, Layer 1 shall receive the following information from the higher layers (RRC):

- The preamble scrambling code.
- The message length in time, either 10 or 20 ms.
- The AICH_Transmission_Timing parameter [0 or 1].
- The available signatures and RACH sub-channel groups for each Access Service Class (ASC), where a sub-channel group is defined as a group of some of the sub-channels defined in subclause 6.1.1.
- The power-ramping factor Power_Ramp_Step [integer > 0].
- The parameter Preamble_Retrans_Max [integer > 0].
- The initial preamble power Preamble_Initial_Power.

Ex. 1011 at 21 (highlighting added).

The physical random-access procedure shall be performed as follows:

- 1 Randomly select the RACH sub-channel group from the available ones for the given ASC. The random function shall be such that each of the allowed selections is chosen with equal probability.
- 2 Derive the available access slots in the next two frames, defined by SFN and SFN+1 in the selected RACH sub-channel group with the help of SFN and table 7. Randomly select one uplink access slot from the available access slots in the next frame, defined by SFN, if there is one available. If there is no access slot available in the next frame, defined by SFN then, randomly select one access slot from the available access slots in the following frame, defined by SFN+1. The random function shall be such that each of the allowed selections is chosen with equal probability.
- 3 Randomly select a signature from the available signatures for the given ASC. The random function shall be such that each of the allowed selections is chosen with equal probability.
- 4 Set the Preamble Retransmission Counter to Preamble_Retrans_Max.
- 5 Set the preamble transmission power to Preamble_Initial_Power.
- 6 Transmit a preamble using the selected uplink access slot, signature, and preamble transmission power.
- 7 If no positive or negative acquisition indicator ($AI \neq +1$ nor -1) corresponding to the selected signature is detected in the downlink access slot corresponding to the selected uplink access slot:
 - 7.1 Select a new uplink access slot as next available access slot, i.e. next access slot in the sub-channel group used, as selected in 1.
 - 7.2 Randomly selects a new signature from the available signatures within the given ASC. The random function shall be such that each of the allowed selections is chosen with equal probability.
 - 7.3 Increase the preamble transmission power by $\Delta P_0 = \text{Power_Ramp_Step}$ [dB].

Ex. 1011 at 22 (highlighting added).

49. The basic power ramping procedure described in 3GPP TS 25.214 has withstood the test of time and is still used in 4G/LTE and 5G/NR wireless standards to this day. This includes the preamble transmission power control parameters Preamble_Initial_Power and Power_Ramp_Step, though the names of these parameters have changed slightly over the years.²

² The term “preambleInitialReceivedTargetPower” is equivalent to “Preamble_Initial_Power,” while “powerRampingStep” is equivalent to “Power_Ramp_Step.”

VII. OVERVIEW OF THE '207 PATENT

50. The '207 Patent is titled “Terminal apparatus, base station apparatus, communication method, and integrated circuit.” As noted above, the alleged invention relates to transmission power control of random access preambles.

51. For example, the '207 Patent describes 4-step and 2-step contention based random access procedures that were well known in the prior art. *See, e.g.*, Ex. 1001 at 12:13–23. The 4-step contention based random access procedure is depicted in Figure 6, which is reproduced below.

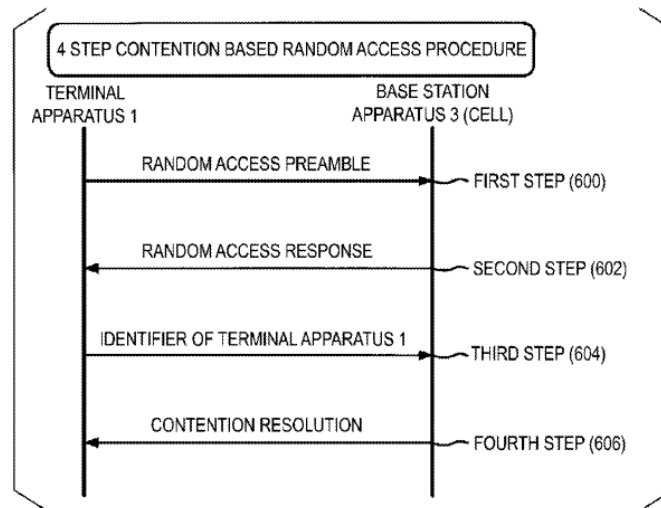


FIG. 6

Ex. 1001 at Fig. 6.

52. Likewise, Figure 7 of the '207 Patent “illustrat[es] one example of the 2-step contention based random access procedure according to the present embodiment.” Ex. 1001 at 13:17–21.

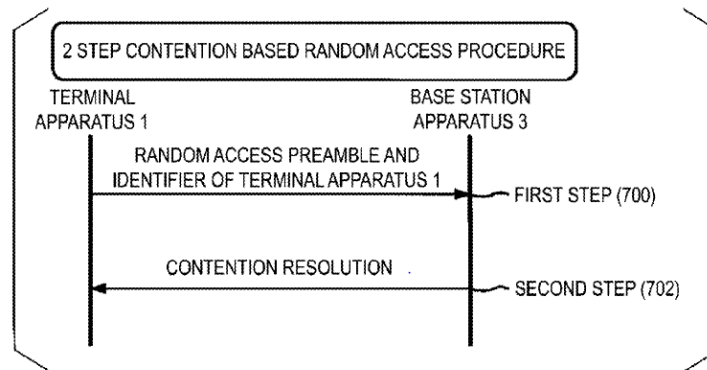


FIG. 7

Ex. 1001 at Fig. 7.

53. As reflected in the figures reproduced above, and further explained in the '207 Patent, both 4-step and 2-step contention based random access procedures begin by the mobile device transmitting a random access preamble to the base station. *See, e.g.*, Ex. 1001 at 12:29–35, 13:22–33.

54. The '207 Patent also discloses that the transmission power of random access preambles can be configured using the conventional power ramping procedure outlined above in Section VI.B. This is reflected in Equation 6 of the '207 Patent, which is reproduced below.

$$\text{PREAMBLE_RECEIVED_TARGET_POWER} = \text{pre-ambleInitialReceivedTargetPower}(m) + \text{DEL-TA_PREAMBLE}(F) + (\text{PREAMBLE_TRANSMISSION_COUNTER} - 1) * \text{powerRampingStep}(m);$$

Equation 6

Ex. 1001 at Equation 6 (highlighting added).

55. In Equation 6, the initial transmission power is defined by “preambleInitialReceivedTargetPower(m),” while the power ramping step is defined by “powerRampingStep(m).” Ex. 1001 at 29:51–30:23. The ’207 Patent explains that a common preambleInitialReceivedTargetPower and a common powerRampingStep may be used for both 2-step and 4-step contention based random access procedures.

Common preambleInitialReceivedTargetPower may be used for the 2 step contention based random access response procedure, the 4 step contention based random access response procedure, and the non-contention based random access procedure. Common powerRampingStep may be used for the 2 step contention based random access response procedure, the 4 step contention based random access response procedure, and the non-contention based random access procedure.

Ex. 1001 at 30:3–12.

56. The alleged invention of the ’207 Patent merely combines the background concepts from the prior art outlined above. *See supra* Section VI. Elements 4.1 and 4.2 of Claim 4 (which is exemplary) concern 2-step and 4-step contention based random access procedures that were well known before the alleged priority date. Elements 4.3 through 4.5 are directed to the conventional power

ramping procedure that skilled artisan have used for decades, including in both 3G/WCDMA and 4G/LTE wireless standards.

- 4. A base station device comprising:
 - 4.1 control circuitry configured to control a 2-step contention based random-access procedure and a 4-step contention based random-access procedure; and
 - 4.2 reception circuitry configured to receive a physical random access channel with a random access preamble in a first step of the 2-step contention based random-access procedure or in a first step of the 4-step contention based random-access procedure; wherein
 - 4.3 transmission power for the physical random access channel is given based at least on a PREAMBLE_RECEIVED_TARGET_POWER;
 - 4.4 for the 4-step contention based random access procedure, the PREAMBLE_RECEIVED_TARGET_POWER is given based at least on a preambleInitialReceivedTargetPower(0) and a powerRampingStep(0); and
 - 4.5 for the 2-step contention based random access procedure, the PREAMBLE_RECEIVED_TARGET_POWER is given based at least on a preambleInitialReceivedTargetPower(1) and a powerRampingStep(1).

Ex. 1001 at Claim 4 (annotations added).

VIII. CLAIM CONSTRUCTION

57. I have been told that claim terms in an *inter partes* review proceeding are to be given their ordinary and accustomed meaning as understood by a person of ordinary skill in the art. In my analysis of the Challenged Claims, I have applied the plain and ordinary meaning as understood by a person of ordinary skill in the art at the relevant time. In my analysis, it was not necessary to construe any terms because

all limitations in the '207 Patent are disclosed in the prior art under any reasonable interpretation of the claim terms.

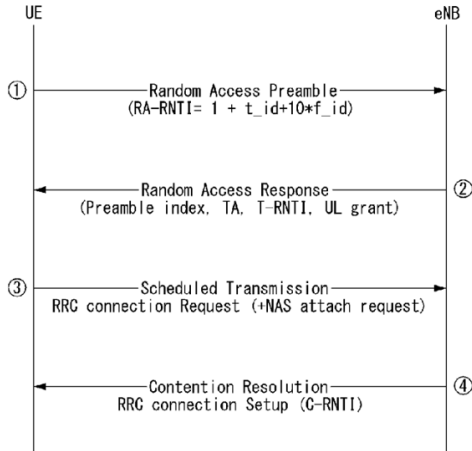
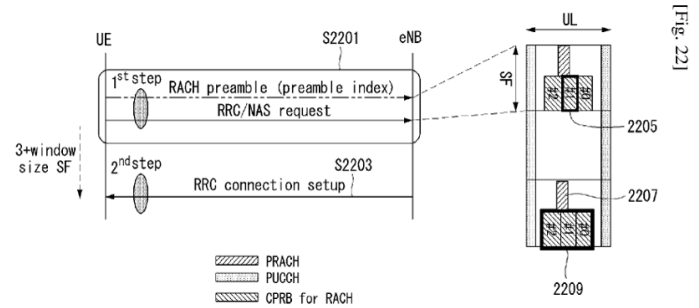
IX. PRIOR ART

A. US Patent Publication No. 2017/0019930 (“Lee1”)

58. United States Patent Application Publication No. 2017/0019930 (“Lee1”) is a United States Patent Application Publication titled “Method for Allocating Temporary Identifier to Terminal in Random Access Procedure in Wireless Communication System and Apparatus Therefor.” Ex. 1005 at Cover. Lee1 was published on January 19, 2017 and filed February 12, 2015. Ex. 1005 at Cover. As a result, I understand that Lee1 qualifies as prior art to the '207 Patent.

59. Lee1 teaches that an “object of the present invention is to define 2-step random access procedure in order to minimize latency of the related art 4-step random access procedure.” Ex. 1005 at [1006]. As shown below, Lee1 illustrates a 4-step contention based random access procedure and a 2-step contention based random access procedure in Figures 9 and 22, respectively.

[Fig. 9]



Ex. 1005 at Figs. 9, 22; *see also* Ex. 1005 at [0150], [0317] (confirming that the figures depict contention based random access procedures).

60. In addition to teaching 2-step and 4-step contention based random access procedures, Lee1 discloses the use of power ramping to control the transmission power of random access preambles, including the very same parameters claimed in the '207 Patent.

First, the terminal randomly selects one random access preamble (RACH preamble) from an set of random access preambles indicated through system information or a handover command, and selects physical RACH (PRACH) resource for transmitting the random access preamble, and transmits the same. The terminal sets transmission power of the random access preamble (PREAMBLE_RECEIVED_TARGET_POWER) to ('**preambleinitialReceivedTargetPower**' + 'DELTA_PREAMBLE' + ('PREAMBLE_TRANSMISSION_COUNTER'? 1) * '**powerRampingStep**'), and transmits the same. Here, "**preambleinitialReceivedTargetPower**" indicate initial transmission power, and "DELTA_PREAMBLE" indicates a power offset value according to a preamble format. "PREAMBLE_TRANSMISSION_COUNTER" indicates the number of preamble transmissions.

“powerRampingStep” indicates a power ramping factor. These values are signaled as part of system information to the terminal.

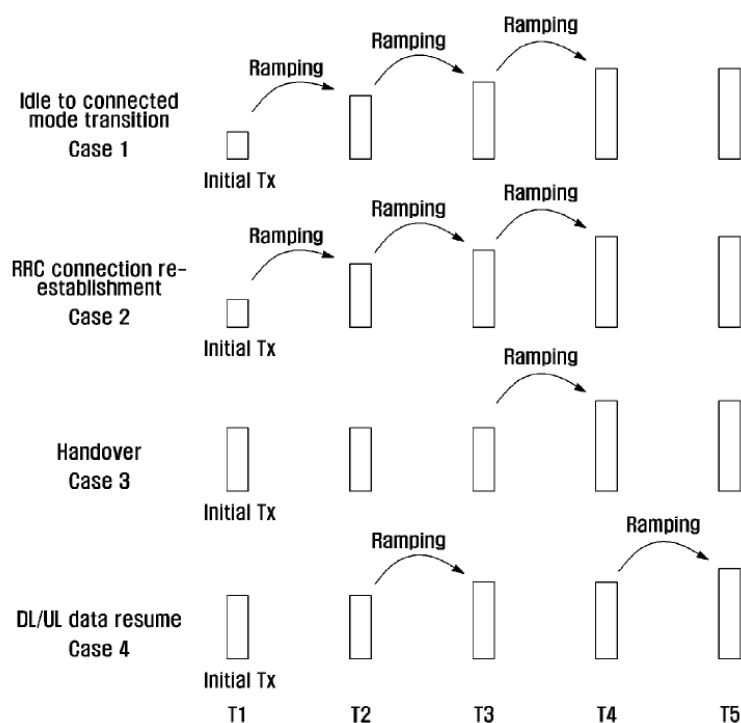
Ex. 1005 at [0152] (emphasis added).

B. US Patent Publication No. 2010/0255847 (“Lee2”)

61. United States Patent Application Publication No. 2010/0255847 (“Lee2”) is a United States Patent Application Publication titled “Apparatus and Method for Random Access in Wireless Communication System.” Ex. 1006 at Cover. Lee2 was published on October 7, 2010 and filed April 1, 2010. Ex. 1006 at Cover. As a result, I understand that Lee2 qualifies as prior art to the ’207 Patent.

62. Lee2 is directed to techniques for controlling the transmission power of random access preambles. Ex. 1006 at Abstract. In particular, Lee2 teaches that it is desirable to use different transmission power control parameters for different types of random access procedures. Ex. 1006 at [0011]–[0012]. For example, as shown in Figure 2, Lee2 teaches different values for initial transmission power (*i.e.*, preambleinitialReceivedTargetPower) and the power ramping factor (*i.e.*, powerRampingStep) when random access is triggered by different triggering conditions.

FIG . 2



Lee2 at Fig. 2, [0026]–[0031]; *see also* Lee2 at Fig. 1, [0009] (showing, in an alternative embodiment, that “the general random access process is performed using the same initial transmission power and ramping power”).

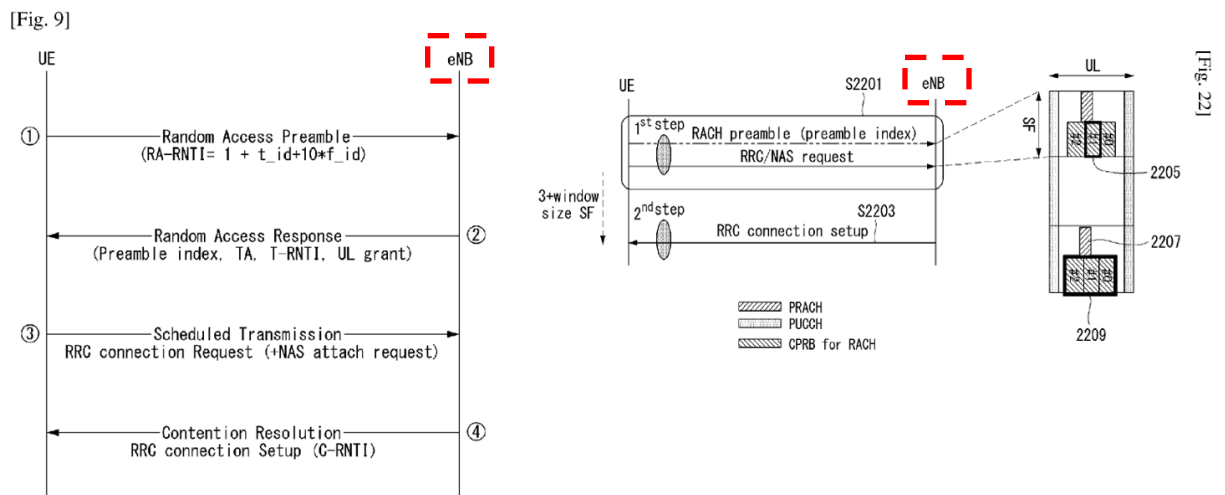
X. CLAIMS 4–6 AND 8 ARE UNPATENTABLE

A. Ground #1: The Challenged Claims are Anticipated and/or Rendered Obvious in View of Lee1

1. Claim 4

- a. Preamble and Element 4.1: “A base station device comprising: control circuitry configured to control a 2-step contention based random-access procedure and a 4-step contention based random-access procedure; and”**

63. Lee1 discloses 4-step and 2-step contention based random access procedures in Figures 9 and 22, respectively. Ex. 1005 at [0150], [0317]. As shown below, Lee1 teaches that these processes involve a UE (*i.e.*, a mobile device) attempting random access to a wireless network by exchanging various messages with an eNB (*i.e.*, a base station device).



Ex. 1005 at Figs. 9, 22 (annotations added); *see also* Ex. 1005 at Fig. 15, [0241] (explaining that “two steps of RACH procedure may be performed by transmitting

the message 3 and the RACH preamble sequence simultaneously or sequentially,” which has “an effect to shorten the time for transmitting the RRC message”).

64. Lee1 teaches that the base station broadcasts control information for the 2-step and 4-step contention based random access procedures depicted above. This control information includes a cell-specific set of random access preamble sequences and radio resource information (*e.g.*, frequency and timing information) that the mobile device needs to transmit preambles over the random access channel. *See, e.g.*, Ex. 1005 at [0132]. In a similar vein, the base station broadcasts control information for the transmission power of random access preambles, including values for “preambleInitialReceivedTargetPower” and “powerRampingStep.” *See* Ex. 1005 at [0152] (explaining that “[t]hese values are signaled as part of system information to the terminal”). The base stations disclosed in Lee1 broadcast the control information identified above to mobile devices to control any 2-step contention based random access procedure or 4-step contention based random access procedure attempted by such mobile devices.

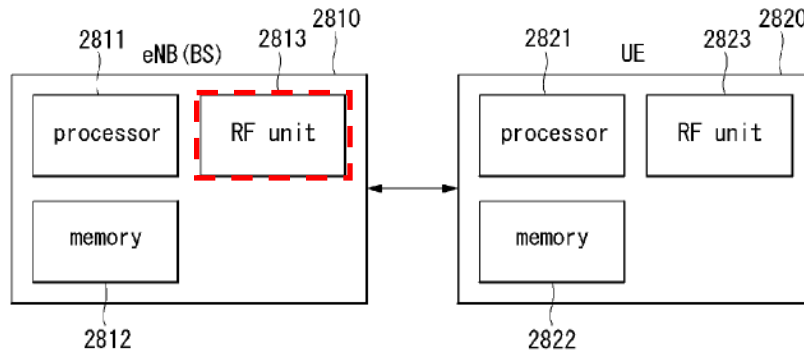
65. Thus, Lee1 discloses both the preamble and element 4.1 of Claim 4.

- b. Element 4.2: “reception circuitry configured to receive a physical random access channel with a random access preamble in a first step of the 2-step contention based random-access procedure or in a first step of the 4-step contention based random-access procedure”**

66. As noted in the my analysis of the Preamble and Element 4.1, Lee1 discloses 4-step and 2-step contention based random access procedures that involve messages exchanged between the mobile device and the base station. *See supra* Section X.A.1.a. Regardless of the number of steps needed to complete random access, the first transmission from the mobile device to the base station is the random access preamble. *See* Ex. 1005 at Fig. 9, 22 (showing that the base station receives a random access preamble in the first step of both 2-step and 4-step random access).

67. Lee1 teaches that the base station receives random access preambles over a Physical Random Access Channel (PRACH). Ex. 1005 at [0093], [0153], [0239]. Lee1 uses the terms “PRACH” and “RACH” interchangeably to refer to this channel. In other words, the random access channel (abbreviated “RACH”) discussed in Lee1 is necessarily a physical random access channel (abbreviated “PRACH”) regardless of whether the “P” is included/omitted from the acronym. As shown below, the base station comprises an “RF unit” (*i.e.*, reception circuitry) configured to receive random access transmissions over the PRACH.

[Fig. 28]



Ex. 1005 at Fig. 28 (annotations added); *see also* Ex. 1005 at [0386]–[0387].

c. Element 4.3: “transmission power for the physical random access channel is given based at least on a PREAMBLE_RECEIVED_TARGET_POWER;”

68. Leel discloses that the transmission power for the PRACH is given based on at least “PREAMBLE_RECEIVED_TARGET_POWER.” As shown below, Leel teaches that the mobile device transmits random access preambles to the base station over the PRACH. For such transmissions, Leel further teaches that the mobile device sets the transmission power to PREAMBLE_RECEIVED_TARGET_POWER.

First, **the terminal** randomly selects one random access preamble (RACH preamble) from an set of random access preambles indicated through system information or a handover command, and **selects physical RACH (PRACH) resource for transmitting the random access preamble, and transmits the same. The terminal sets transmission power of the random access preamble (PREAMBLE_RECEIVED_TARGET_POWER)** to (‘preambleinitialReceivedTargetPower’ + ‘DELTA_PREAMBLE’ + (‘PREAMBLE_TRANSMISSION_COUNTER’? 1) * ‘powerRampingStep’), and transmits the same. Here, “preamb

leinitialReceivedTargetPower” indicate initial transmission power, and “DELTA_PREAMBLE” indicates a power offset value according to a preamble format. “PREAMBLE_TRANSMISSION_COUNTER” indicates the number of preamble transmissions. “powerRampingStep” indicates a power ramping factor. These values are signaled as part of system information to the terminal.

Ex. 1005 at [0152] (emphasis added).

- d. **Element 4.4: “for the 4-step contention based random access procedure, the PREAMBLE_RECEIVED_TARGET_POWER is given based at least on a preambleInitialReceivedTargetPower(0) and a powerRampingStep(0);”**

69. Lee1 discloses that the transmission power of a random access preamble (*i.e.*, PREAMBLE_RECEIVED_TARGET_POWER) is based on an equation that includes parameters for the initial transmission power of random access preambles (“preambleInitialReceivedTargetPower”) and a set amount by which the mobile device will increase the transmission power each time it reattempts random access (“powerRampingStep”).

First, the terminal randomly selects one random access preamble (RACH preamble) from an set of random access preambles indicated through system information or a handover command, and selects physical RACH (PRACH) resource for transmitting the random access preamble, and transmits the same. The terminal sets transmission power of the random access preamble (PREAMBLE_RECEIVED_TARGET_POWER) to (**preambleInitialReceivedTargetPower** + 'DELTA_PREAMBLE' + ('PREAMBLE_TRANSMISSION_COUNTER'? 1) * **powerRampingStep**), and transmits the same. Here, **“preambleInitialReceivedTargetPower” indicate initial transmission power**, and “DELTA_PREAMBLE” indicates a power offset value according to a preamble format. “PREAMBLE_TRANSMISSION_COUNTER” indicates the number of preamble

transmissions. **“powerRampingStep” indicates a power ramping factor.** These values are signaled as part of system information to the terminal.

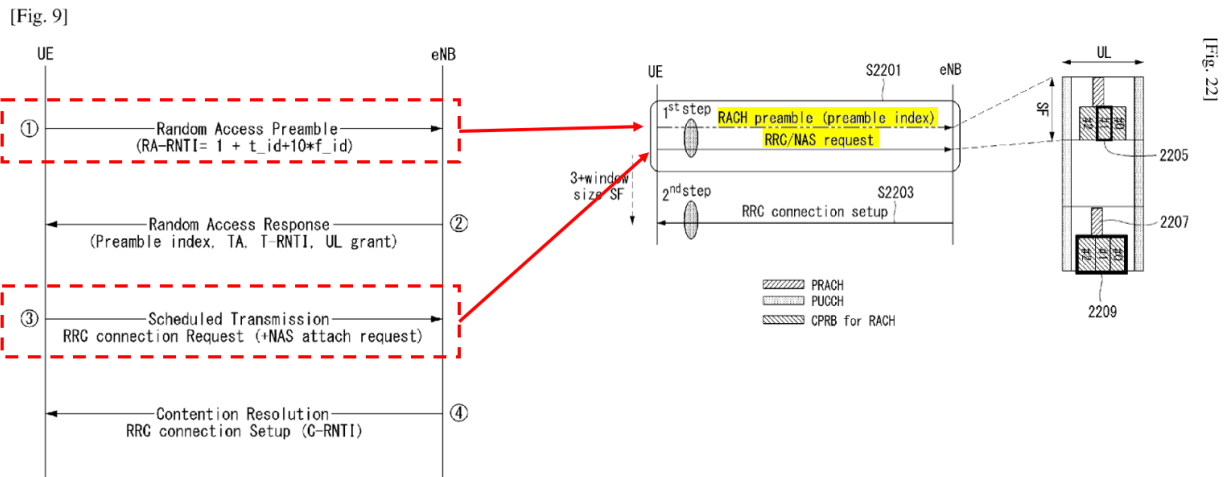
Ex. 1005 at [0152] (emphasis added).

70. Lee1’s teaching that power ramping is used to configure the transmission power of random access preambles is equally applicable to both 4-step and 2-step contention based random access procedures. As explained in Lee1, 2-step contention based random access procedure is enabled by combining steps 1 and 3 of the conventional, 4-step random access procedure into a single step.

Referring to FIG. 15(a), a UE transmits a RACH preamble sequence through the PRACH, and simultaneously or sequentially transmits an RRC message to an eNB through the CP zone (particularly, through the CPRB of the CP zone) (S1501). . . . Through this, there is an effect to shorten the time for transmitting the RRC message. In other word, the UE performs the contention based random access procedure through the CP zone, thus, **two steps of RACH procedure may be performed by transmitting the message 3 and the RACH preamble sequence simultaneously or sequentially.**

Ex. 1005 at [0238]–[0241] (emphasis added).

71. This is further shown by comparing steps 1 and 3 in Figure 9 (4-step random access) with the first step in Figure 22 (2-step random access). As shown below, Lee1 teaches that the random access preamble is transmitted in the first step of random access in both the 4-step and the 2-step embodiments of the procedure.



Ex. 1005 at Figs. 9, 22 (annotations added)

72. As a result, a skilled artisan would know that Lee1's teachings regarding random access preambles, including the methodology for transmission power control of such preambles taught in paragraph [0152], are generally applicable regardless of the total number of steps that are necessary to complete random access. Lee1 thus teaches the use of power ramping to control the transmission power of random access preambles in both 2-step and 4-step contention based random access.

73. For the reasons explained above, Lee1 teaches that `PREAMBLE_RECEIVED_TARGET_POWER` is given based at least on a `preambleInitialReceivedTargetPower(0)` and a `powerRampingStep(0)` for random access preambles transmitted to the base station as part of a 4-step contention based random access procedure.

- e. **Element 4.5: “for the 2-step contention based random access procedure, the PREAMBLE_RECEIVED_TARGET_POWER is given based at least on a preambleInitialReceivedTargetPower(1) and a powerRampingStep(1).”**

74. Lee1 teaches that the transmission power control of random access preambles (*i.e.*, PREAMBLE_RECEIVED_TARGET_POWER) are based on an equation that includes parameters for the initial transmission power of random access preambles (“preambleInitialReceivedTargetPower”) and a set amount by which the mobile device increases the transmission power each time it reattempts random access (“powerRampingStep”). Ex. 1005 at [0152].” As discussed above in connection with Element 4.4, Lee1’s teachings regarding transmission power control of random access preambles are generally applicable to both 4-step contention based random access procedure and 2-step contention based random access procedure. Accordingly, paragraph 152 of Lee1 discloses this claim element for the same reasons that it discloses Element 4.4 of the ’207 Patent (discussed above). *See supra* Section X.A.1.d.

75. In addition, I was asked to consider whether the Challenged Claims of the ’207 Patent (including Element 4.5) require different values for preambleInitialReceivedTargetPower and powerRampingStep for 2-step contention based random access compared to 4-step contention based random access. To the extent that Patent Owner raises such an argument, I disagree that the claims are

limited in such a manner. On the contrary, the '207 Patent clearly states that the same values for preambleInitialReceivedTargetPower and powerRampingStep may be used for both 2-step and 4-step contention based random access.

76. As shown below, the '207 Patent states that “[c]ommon preambleInitialReceivedTargetPower” and “common powerRampingStep may be used for the 2 step contention based random access response procedure [and] the 4 step contention based random access response procedure.”

Common preambleInitialReceivedTargetPower may be used for the 2 step contention based random access response procedure, the 4 step contention based random access response procedure, and the non-contention based random access procedure. Common powerRampingStep may be used for the 2 step contention based random access response procedure, the 4 step contention based random access response procedure, and the non-contention based random access procedure.

Ex. 1001 at 30:3–12. Given that the '207 Patent expressly teaches that “common” preambleInitialReceivedTargetPower and powerRampingStep may be used for 2-step and 4-step contention based random access, the Challenged Claims do not require different power control parameters for the 2-step procedure compared to the 4-step procedure.

77. In addition, I note that it would have been obvious to a skilled artisan to use the power ramping procedure disclosed in Lee1 in combination with the 2-step and 4-step procedures that are also disclosed in Lee1. As noted above, power

ramping plays an important role because it allows the mobile device to connect to the network in an energy efficient manner while causing minimal interference to other transmission. *See supra* Section VI.B. This is why power ramping has been used in every cellular standard since 3G. *See, e.g.*, Ex. 1011. It would have been obvious to a skilled artisan to use the standard procedure for preamble power control disclosed in paragraph [0152] of Lee1 with the 2-step and 4-step random access procedures taught in other paragraphs of Lee1.

2. Claim 5

- a. “The base station device according to claim 4, wherein the preambleInitialReceivedTargetPower(0) and the preambleInitialReceivedTargetPower(1) and the powerRampingStep(0) and the powerRampingStep(1) are given by radio resource control information.”**

78. Lee1 teaches that the base station broadcasts preamble transmission power control parameters for both 2-step random access (*i.e.*, the claimed “preambleInitialReceivedTargetPower(1)” and “powerRampingStep(1)”) and 4-step random access (*i.e.*, the claimed “preambleInitialReceivedTargetPower(0)” and “powerRampingStep(0)”). As shown below, Lee1 teaches that the relevant power control parameters “are signaled as part of system information to the terminal [*i.e.*, the mobile device].”

First, the terminal randomly selects one random access preamble (RACH preamble) from an set of random access preambles indicated through system information or a handover command, and selects

physical RACH (PRACH) resource for transmitting the random access preamble, and transmits the same. The terminal sets transmission power of the random access preamble (PREAMBLE_RECEIVED_TARGET_POWER) to ($\text{preambleInitialReceivedTargetPower} + \text{DELTA_PREAMBLE} + (\text{PREAMBLE_TRANSMISSION_COUNTER} - 1) * \text{powerRampingStep}$), and transmits the same. Here, “preambleInitialReceivedTargetPower” indicate initial transmission power, and “DELTA_PREAMBLE” indicates a power offset value according to a preamble format. “PREAMBLE_TRANSMISSION_COUNTER” indicates the number of preamble transmissions. “powerRampingStep” indicates a power ramping factor. **These values are signaled as part of system information to the terminal.**

Ex. 1005 at [0152] (emphasis added).

79. Skilled artisans in the field of wireless telecommunications know that the “system information” referenced above is a type of Radio Resource Control (RRC) information. In this context, RRC information refers to information exchanged between mobile devices and base stations to establish, manage, and/or release connections over the air interface. As a result, Lee1’s disclosure that preambleInitialReceivedTargetPower and powerRampingStep are signaled to mobile devices via “system information” necessarily teaches that these parameters are given by RRC information.

80. For example, there are detailed technical specifications dedicated to “Radio Resource Control (RRC)” functionality in a wireless network implementing 3G, 4G, and/or 5G wireless standards. One of these technical specifications, 3GPP TS 36.331 V13.0.0 (“TS 36.331”), is cited on the cover of the ’207 Patent. Consistent

with the well-understood meaning of RRC information in the field of wireless communications discussed above, TS 36.331 confirms that “[b]roadcast of system information” is one of the “main functions” of the RRC protocol:

4.4 Functions

The RRC protocol includes the following main functions:

- Broadcast of system information:
 - Including NAS common information;
 - Information applicable for UEs in RRC_IDLE, e.g. cell (re-)selection parameters, neighbouring cell information and information (also) applicable for UEs in RRC_CONNECTED, e.g. common channel configuration information.
 - Including ETWS notification, CMAS notification;

Ex. 1010 (TS 36.331) at 27. Moreover, a skilled artisan would have known to broadcast this information via RRC, as has been documented in every cellular standard release since the initial release of the 3G standard. *See* Ex. 1011 (TS 25.214) at 379–80 (RRC Protocol Specification including preambleInitialReceivedTargetPower and powerRampingStep within its description of *RACH-ConfigCommon* information element).

81. Further confirming that the parameters for preambleInitialReceivedTargetPower and powerRampingStep disclosed in Lee1 are a type of RRC information, TS 36.331 expressly states that these parameters are part of the system information broadcast to mobile devices in 4G/LTE networks.

– RACH-ConfigCommon

The IE *RACH-ConfigCommon* is used to specify the generic random access parameters.

***RACH-ConfigCommon* information element**

```
-- ASN1START
```

```
RACH-ConfigCommon ::= SEQUENCE {
    preambleInfo          SEQUENCE {
```

...

```
PowerRampingParameters ::= SEQUENCE {
    powerRampingStep      ENUMERATED {dB0, dB2, dB4, dB6},
    preambleInitialReceivedTargetPower ENUMERATED {
        dBm-120, dBm-118, dBm-116, dBm-114, dBm-112,
        dBm-110, dBm-108, dBm-106, dBm-104, dBm-102,
        dBm-100, dBm-98, dBm-96, dBm-94,
        dBm-92, dBm-90}
```

Ex. 1010 (TS 36.331) at 378–79 (emphasis added); *see also Id.* at 380 (providing definitions of `preambleInitialReceivedTargetPower` and `powerRampingStep` that are identical to those disclosed in Lee1).

82. Thus, a skilled artisan would recognize that Lee1 teaches every element of Claim 5 based on the plain and ordinary meaning of “radio resource control information” in the field of wireless telecommunications.

3. Claim 6

- a. “The base station device according to claim 4, wherein the powerRampingStep(0) is a step size for power ramping up for the PREAMBLE_RECEIVED_TARGET_POWER for the 4-step contention based random access procedure, and the powerRampingStep(1) is a step size for power ramping up for the PREAMBLE_RECEIVED_TARGET_POWER for the 2 step contention based random access procedure.”**

83. Lee1 teaches that the value for powerRampingStep refers to a step size for power ramping in a 4-step contention based random access procedure or a 2-step contention based random access procedure. As explained above, Lee1’s disclosure regarding the “powerRampingStep” parameter is equally applicable to 4-step and 2-step contention based random access procedures. *See supra* Section X.A.1.d. By definition, the “powerRampingStep” disclosed in Lee1 is a step size for increasing the transmission power (*i.e.*, “power ramping up”) of the random access preamble each time random access is attempted without success. Ex. 1005 at [0152]. Lee1 teaches that “PREAMBLE_RECEIVED_TARGET_POWER” is based on the “powerRampingStep” and other inputs. Ex. 1005 at [0152]. Thus, Lee1 teaches every element of Claim 6.

4. **Claim 8**

a. **Lee1 Anticipated and/or Renders Obvious Claim 8 for the Same Reasons It Anticipates and/or Renders Obvious Claim 4**

84. As shown below, Claim 8 of the '207 Patent is very similar to Claim 4.

“A communication method used for a base station device comprising: controlling a 2-step contention based random-access procedure and a 4-step contention based random-access procedure; and

receiving a physical random access channel with a random access preamble in a first step of the 2-step contention based random-access procedure or in a first step of the 4-step contention based random-access procedure; wherein

transmission power for the physical random access channel is given based at least on a PREAMBLE_RECEIVED_TARGET_POWER;

for the 4-step contention based random access procedure, the PREAMBLE_RECEIVED_TARGET_POWER is given based at least on a preambleInitialReceivedTargetPower(0) and a powerRampingStep(0); and

for the 2-step contention based random access procedure, the PREAMBLE_RECEIVED_TARGET_POWER is given based at least on a preambleInitialReceivedTargetPower(1) and a powerRampingStep(1).

Ex. 1001 at Claim 8.

85. The difference between Claim 8 and Claim 4 of the '207 Patent is that Claim 8 is directed to a “communication method used for a base station device,” while Claim 4 is directed to a “base station device.” This distinction is not relevant to my analysis of the Challenged Claims in view of the prior art cited in this declaration and does not affect my conclusions. Lee1 teaches the claimed

“communication method used for a base station device” for the same reasons Lee1 teaches the claimed “base station device.” Accordingly, Lee1 teaches Claim 8 for the same reasons that it teaches Claim 4. *See supra* X.A.1.a.

B. Ground #2: The Challenged Claims are Obvious in View of Lee1 Combined with Lee2

1. A POSITA Would Have Been Motivated to Combine Lee1 and Lee2 and Would Have Had an Expectation of Success in Doing So

86. It is my opinion that Lee1 alone anticipates and/or renders obvious the Challenged Claims of the '207 Patent. However, I was asked to assume that the claims require different values for “preambleInitialReceivedTargetPower(0)” and “powerRampingStep(0)” in element 4.4 compared to “preambleInitialReceivedTargetPower(1)” and “powerRampingStep(1)” in element 4.5. With this assumption, I was asked whether the prior art to the '207 Patent nonetheless teaches the Challenged Claims. As explained below, the Challenged Claims of the '207 Patent are, at the very least, obvious in view of the prior art regardless of how elements 4.4 and 4.5 are interpreted.

87. As explained above, Lee1 teaches the claimed “preambleInitialReceivedTargetPower” and “powerRampingStep” for both 2-step and 4-step contention based random access procedures. *See supra* Sections X.A.1–2. However, Lee1 does not expressly teach that mobile devices initiating the 4-step contention based random access procedure use different values for

preambleInitialReceivedTargetPower and powerRampingStep than mobile devices initiating the 2-step contention based random access procedure. To the extent that the Challenged Claims require different values for “preambleInitialReceivedTargetPower” and “powerRampingStep” for different types of random access procedure, the Challenged Claims are obvious in view of Lee1 combined with Lee2.

88. It would have been obvious for a skilled artisan to supplement Lee1 with Lee2 because both references are directed to techniques for reducing the latency associated with random access. Lee2’s proposed solution “reduc[es] time delay due to random access” by “properly allocate[ing] random access preamble transmission power in a wireless communication system based on events for triggering random access or cases where random access needs to be performed.” Ex. 1006 at [0011]. By contrast, Lee1’s proposed solution “is to define 2-step random access procedure in order to minimize latency of the related art 4-step random access procedure.” Ex. 1005 at [0006].

89. Lee1’s proposed solution for reducing latency (*i.e.*, complete random access in fewer steps) is complementary to Lee2’s proposed solution for reducing latency (*i.e.*, optimize the transmission power of random access preambles for different types of random access). Thus, a skilled artisan would have been motivated to combine Lee1 and Lee2 because combining the solutions disclosed in these

references would result in a larger improvement to the overall latency associated with random access than either solution can achieve on its own.

2. Analysis of the Challenged Claims in Light of Lee1 Combined with Lee2

90. The bulk of my analysis of the Challenged Claims in view of Lee1 alone is equally applicable here. Under the assumption outlined above, the combined teachings of Lee1 and Lee2 are particularly relevant to Elements 4.4 and 4.5.

[4.4] for the 4-step contention based random access procedure, the PREAMBLE_RECEIVED_TARGET_POWER is given based at least on a preambleInitialReceivedTargetPower(0) and a powerRampingStep(0); and

[4.5] for the 2-step contention based random access procedure, the PREAMBLE_RECEIVED_TARGET_POWER is given based at least on a preambleInitialReceivedTargetPower(1) and a powerRampingStep(1).

Ex. 1001 at Claim 4. To the extent that the claims require different values for the claimed preamble transmission power control parameters, it would have been obvious for a skilled artisan to combine the 4-step and 2-step contention based random access procedures disclosed in Lee1 with the event-specific preamble transmission power control parameters taught in Lee2.

91. Lee2 teaches that using event-specific values for initial transmission power and power ramping step of random access preambles can reduce the amount of time it takes to complete random access. Ex. 1006 at [0011], [0042], [0109]. As shown below, Lee2 teaches a random access procedure that uses “random access

parameters having different values” depending on the “event[] for triggering random access” or the “case[] where random access needs to be performed.”

Accordingly, an aspect of the present invention provides a method and apparatus that can **properly allocate random access preamble transmission power** in a wireless communication system, **based on events for triggering random access or cases where random access needs to be performed**, thereby reducing time delay due to random access.

...

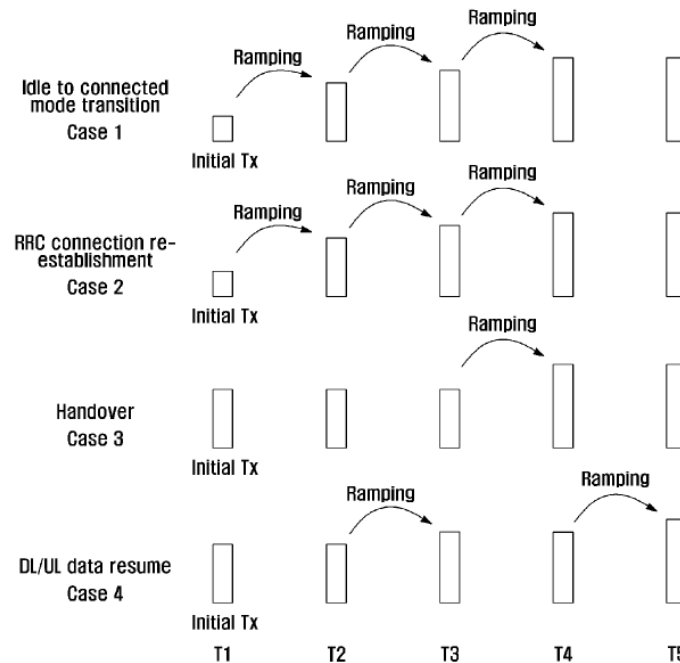
A plurality of random access parameters having different values in accordance with a plurality of events for triggering random access are set. When one of the plurality of events for triggering random access has occurred, random access is performed according to at least one of the plurality of random access parameters corresponding to the event.

Ex. 1006 at [0011]–[0012] (emphasis added).

92. The “random access parameters” contemplated in Lee2 include “initial transmission power Preamble_Initial_Power_n” and “ramping power Ramping_Power_n.” Ex. 1006 at [0030]. The parameter for “Preamble_Initial_Power_n” in Lee2 corresponds to “preambleInitialReceivedTargetPower[n]” in the Challenged Claims, while the parameter for “Ramping_Power_n” in Lee2 corresponds to “powerRampingStep[n]” in the Challenged Claims. *See* Ex. 1006 at [0031]–[0032]. The “n” in “Preamble_Initial_Power_n” and “Ramping_Power_n” indicates that the values of these parameters differ for different types of random access. As reflected in Figure 2, Lee2 teaches different values for these random access parameters

(“Initial Tx” and “Ramping” in Figure 2) for different events that trigger random access.

FIG . 2



Ex. 1006 at Fig. 2.

93. In view of Lee2’s disclosure that event-specific random access parameters may enhance the performance of wireless systems, it would have been obvious for a skilled artisan to use different random access parameters for the 2-step and 4-step random access procedures disclosed in Lee1.

XI. CONCLUSION

The Challenged Claims simply combine two long-established concepts from the prior art: a random access procedure predating the filing of these Claims and a widely employed method for controlling the transmission power of random access

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preambles present in cellular standards since 3G. Thus, the Challenged Claims were either anticipated or rendered obvious by the prior art. Based on my experience, knowledge of the field at the relevant time, and a thorough analysis of prior art references, it is my expert opinion that the Challenged Claims of the '207 Patent are unpatentable.

Date: March 5, 2024

Executed: Mark Mahon