

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS AMERICA, INC.,

SAMSUNG ELECTRONICS CO., LTD.,

Petitioners,

v.

KONINKLIJKE KPN N.V.,

Patent Owner.

Case No. IPR2025-00534

U.S. Patent No. 9,462,544

**DECLARATION OF KEVIN C. ALMEROOTH, PH.D.
IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT NO. 9,462,544**

Table of Contents

I. Introduction.....	1
II. Qualifications and Background	1
III. Legal Standards	11
A. Claim Construction	12
B. Anticipation Under 35 U.S.C. § 102	13
C. Obviousness Under 35 U.S.C. § 103.....	13
IV. Technology Background	17
V. The '544 Patent.....	21
A. Overview of the '544 patent.....	21
B. Prosecution History.....	24
VI. Grounds	26
VII. Level of Ordinary Skill in the Art	26
VIII. Claim Construction	28
IX. Ground 1: Claim 1 is Obvious Over Frenger in view of Fischer and Hurst .	28
A. Overview of Prior Art	30
1. Frenger (US 2012/0094661)	30
2. Fischer (US 2009/0247150).....	31
3. Hurst (US 2006/0116120).....	33
B. Motivation to Combine	34
C. Reasonable Expectation of Success.....	42
D. Claim 1	43
1. 1[pre]: “A terminal configured for operating in a wireless access telecommunication infrastructure comprising an active base station and at least one inactive cell, wherein the terminal comprises:”	43
2. 1[a]: “a processor for executing instructions that cause the terminal to carry out operations including:”	44
3. 1[b]: “receiving in a transmission from the active base station measurement parameters and/or reporting parameters, wherein the received measurement parameters and/or reporting parameters trigger the terminal to	

obtain information regarding a presence signal from the at least one inactive base station”	45
4. 1[c]: “receiving the presence signal transmitted from the at least one inactive base station;”	50
5. 1[d]: “obtaining a measurement report regarding the presence signal transmitted from the inactive base station and;”	51
6. 1[e]: “providing the measurement report to the telecommunications infrastructure via the active base station,”	53
7. 1[f]: “wherein the operations further include: receiving a reporting identifier transmitted from the inactive base station, the received reporting identifier indicating that the inactive base station is in a probing period;”	55
8. 1[g]: “recognizing the reporting identifier; and”	58
9. 1[h]: “including the reporting identifier in the measurement report, the included reporting identifier being an indication to the telecommunications infrastructure that the measurement report was not obtained as part of a handover to the inactive base station.”	58
X. Ground 2: Claim 1 is Obvious Over Nylander in view of Kim and Lin	60
A. Overview of Prior Art	63
1. Nylander (US 2012/0106423).....	63
2. Kim (WO 2008/084938).....	64
3. Lin (US 6,782,059).....	65
B. Motivation to Combine	66
C. Reasonable Expectation of Success.....	71
D. Claim 1	73
1. 1[pre]: “A terminal configured for operating in a wireless access telecommunication infrastructure comprising an active base station and at least one inactive cell, wherein the terminal comprises:”	73
2. 1[a]: “a processor for executing instructions that cause the terminal to carry out operations including:”	74
3. 1[b]: “receiving in a transmission from the active base station measurement parameters and/or reporting parameters, wherein the received measurement parameters and/or reporting parameters trigger the terminal to	

obtain information regarding a presence signal from the at least one inactive base station”	76
4. 1[c]: “receiving the presence signal transmitted from the at least one inactive base station;”	79
5. 1[d]: “obtaining a measurement report regarding the presence signal transmitted from the inactive base station and;”	80
6. 1[e]: “providing the measurement report to the telecommunications infrastructure via the active base station,”	82
7. 1[f]: “wherein the operations further include: receiving a reporting identifier transmitted from the inactive base station, the received reporting identifier indicating that the inactive base station is in a probing period;”	83
8. 1[g]: “recognizing the reporting identifier; and”	86
9. 1[h]: “including the reporting identifier in the measurement report, the included reporting identifier being an indication to the telecommunications infrastructure that the measurement report was not obtained as part of a handover to the inactive base station.”	87
XI. Secondary Considerations of Non-Obviousness.....	91
XII. Conclusion.....	92

EXHIBIT LIST

EX	Description
1001	U.S. Patent No. 9,462,544 to Ljupco Jorguseski et al. (“the ’544 Patent”)
1002	Prosecution File History for the ’544 Patent
1003	Declaration of Dr. Kevin C. Almeroth
1004	US Patent Pub. No. 2012/0094661 to Pál Frenger et al. (“Frenger”)
1005	U.S. Patent Pub. No. 2009/0247150 to Patrick Fischer et al. (“Fischer”)
1006	U.S. Patent Pub. No. 2006/0116120 to Michael Hurst (“Hurst”)
1007	U.S. Patent Pub. No. 2012/0106423 to Tomas Nylander et al. (“Nylander”)
1008	WIPO Pub. No. 2008/084938 to Jae-Heung Kim et al. (“Kim”)
1009	US Patent No. 6,782,059 to Yu-Chuan Lin (“Lin”)
1010	US Patent No. 8,170,029 to Yoshiharu Tajima et al. (“Tajima”)
1011	<i>Curriculum Vitae</i> of Dr. Kevin C. Almeroth

I. INTRODUCTION

1. I, Kevin C. Almeroth, Ph.D., submit this declaration to state my opinions on the matter described below.

2. I have been retained by Petitioners Samsung Electronics Co., Ltd and Samsung Electronics America, Inc. (“Petitioners”), as an independent expert in this proceeding before the United States Patent and Trademark Office. Although I am being compensated at my usual and customary rate of \$850 per hour, no part of my compensation depends on the outcome of this proceeding, and I have no other interest in this proceeding.

3. I understand that this proceeding involves U.S. Patent No. 9,462,544 (the “’544 patent”), and I have been asked to consider the validity of certain claims of the ’544 patent based on certain prior art references. I have also been asked to consider the state of the art and prior art available on or before May 6, 2010. Based on the prior art discussed in this declaration, it is my opinion that claim 1 of the ’505 patent is unpatentable for the reasons provided below.

II. QUALIFICATIONS AND BACKGROUND

4. I believe that I am well qualified to serve as a technical expert in this matter based upon my educational and work experience, and specifically, in the field of cellular telecommunications and radio-access network architectures and protocols. My curriculum vitae (“CV”) is submitted as EX1011.

5. I am currently a Professor Emeritus in the Department of Computer Science at the University of California, Santa Barbara (UCSB). While at UCSB, I held faculty appointments and was a founding member of the Computer Engineering (CE) Program, Media Arts and Technology (MAT) Program, and the Technology Management Program (TMP). I also served as the Associate Director of the Center for Information Technology and Society (CITS) from 1999 to 2012. I have been a faculty member at UCSB since July 1997.

6. I hold three degrees from the Georgia Institute of Technology: (1) a Bachelor of Science degree in Information and Computer Science (with minors in Economics, Technical Communication, and American Literature) earned in June 1992; (2) a Master of Science degree in Computer Science (with specialization in Networking and Systems) earned in June 1994; and (3) a Doctor of Philosophy (Ph.D.) degree in Computer Science (Dissertation Title: Networking and System Support for the Efficient, Scalable Delivery of Services in Interactive Multimedia System, minor in Telecommunications Public Policy) earned in June 1997. During my education, I have taken a wide variety of courses, as demonstrated by my minor. My undergraduate degree also included a number of courses more typical of a degree in electrical engineering including digital logic, signal processing, and telecommunications theory.

7. One of the major concentrations of my research over the past 30+ years has been the delivery of multimedia content and data between computing devices, including various network architectures. In my research, I have studied large-scale content delivery systems, and the use of servers located in a variety of geographic locations to provide scalable delivery to hundreds or thousands of users simultaneously. I have also studied smaller-scale content delivery systems in which content is exchanged between individual computers and portable devices. My work has emphasized the exchange of content more efficiently across computer networks, including the scalable delivery of content to many users, mobile computing, satellite networking, delivering content to mobile devices, and network support for data delivery in wireless networks.

8. In 1992, the initial focus of my research was on the provision of interactive functions (e.g., VCR-style functions like pause, rewind, and fast-forward) for near video-on-demand systems in cable systems; in particular, how to aggregate requests for movies at a cable head-end and then how to satisfy a multitude of requests using one audio/video stream broadcast to multiple receivers simultaneously. This research has continually evolved and resulted in the development of techniques to scalably deliver on-demand content, including audio, video, web documents, and other types of data, through the Internet and over other

types of networks, including over cable systems, broadband telephone lines, and satellite links. 6. An important component of my research has been investigating the challenges of communicating multimedia content, including video, between computers and across networks including the Internet. Although the early Internet was used mostly for text-based, non-real time applications, the interest in sharing multimedia content, such as video, quickly developed. Multimedia-based applications ranged from downloading content to a device to streaming multimedia content to be instantly used. One of the challenges was that multimedia content is typically larger than text-only content, but there are also opportunities to use different delivery techniques since multimedia content is more resilient to errors. I have worked on a variety of research problems and used a number of systems that were developed to deliver multimedia content to users. One content-delivery method I have researched is the one-to-many communication facility called “multicast,” first deployed as the Multicast Backbone, a virtual overlay network supporting one-to-many communication. Multicast is one technique that can be used on the Internet to provide streaming media support for complex applications like video-on-demand, distance learning, distributed collaboration, distributed games, and large-scale wireless communication. The delivery of media through multicast often involves

using Internet infrastructure, devices and protocols, including protocols for routing and TCP/IP.

9. Starting in 1997, I worked on a project to integrate the streaming media capabilities of the Internet together with the interactivity of the web. I developed a project called the Interactive Multimedia Jukebox (IMJ). Users would visit a web page and select content to view. The content would then be scheduled on one of a number of channels, including delivery to students in Georgia Tech dorms delivered via the campus cable plant. The content of each channel was delivered using multicast communication. In the IMJ, the number of channels varied depending on the capabilities of the server including the available bandwidth of its connection to the Internet. If one of the channels was idle, the requesting user would be able to watch their selection immediately. If all channels were streaming previously selected content, the user's selection would be queued on the channel with the shortest wait time. In the meantime, the user would see what content was currently playing on other channels, and because of the use of multicast, would be able to join one of the existing channels and watch the content at the point it was currently being transmitted. The IMJ service combined the interactivity of the web with the streaming capabilities of the Internet to create a jukebox-like service. It supported true Video-on-Demand when capacity allowed, but scaled to any number of users

based on queuing requested programs. As part of the project, we obtained permission from Turner Broadcasting to transmit cartoons and other short-subject content. We also connected the IMJ into the Georgia Tech campus cable television network so that students in their dorms could use the web to request content and then view that content on one of the campus's public access channels.

10. As a parallel research theme, starting in 1997, I began researching issues related to wireless devices and sensors. In particular, I was interested in showing how to provide greater communication capability to “lightweight devices,” i.e., small form-factor, resource-constrained (e.g., CPU, memory, networking, and power) devices. Starting in 1998, I published several papers on my work to develop a flexible, lightweight, battery-aware network protocol stack. The lightweight protocols we envisioned were similar in nature to protocols like Bluetooth, Universal Plug and Play (UPnP) and Digital Living Network Alliance (DLNA). 12. From this initial work, I have made wireless networking—including ad hoc, mesh networks and wireless devices—one of the major themes of my research. My work in wireless network spans the protocol stack from applications through to the encoding and exchange of data at the data link and physical layers. 13. At the application layer, even before the large-scale “app stores” were available, my research looked at building, installing, and using apps for a variety of purposes, from network

monitoring to support for traditional computer-based applications (e.g., content retrieval) to new applications enabled by ubiquitous, mobile devices. For example, my research has looked at developing applications for virally exchanging and tracking “coupons” through “opportunistic contact” (i.e., communication with other devices coming into communication range with a user). In many of the courses I have taught there is a project component. Through these projects I have supervised numerous efforts to develop new “apps” for download and use across a variety of mobile platforms.

11. Yet another theme of this research was monitoring wireless networks, in particular different variants of IEEE 802.11 compliant networks, to (1) understand the operation of the various protocols used in real-world deployments, (2) use these measurements to characterize use of the networks and identify protocol limitations and weaknesses, and (3) propose and evaluate solutions to these problems. I have successfully used monitoring techniques to study wireless data link layer protocol operation and to improve performance by enhancing the operation of such protocols. For wireless protocols, this research includes functions like network acquisition and channel bonding.

12. My recent work ties some of the various threads of my past research together. I have investigated content delivery in online social networks and proposed

reputation management systems in large-scale social networks and marketplaces. On the content delivery side, I have looked at issues of caching and cache placement, especially when content being shared and the cache has geographical relevance. We were able to show that effective caching strategies can greatly improve performance and reduce deployment costs. Our work on reputation systems showed that reputations have economic value, and as such, creates a motivation to manipulate reputations. In response, we developed a variety of solutions to protect the integrity of reputations in online social networks. The techniques we developed for content delivery and reputation management were particularly relevant in peer-to-peer communication and recommendations for downloadable “apps.”

13. As an important component of my research program, I have been involved in the development of academic research into available technology in the market place. One aspect of this work is my involvement in the Internet Engineering Task Force (IETF). The IETF is a large and open international community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet. I have been involved in various IETF groups including many content delivery-related working groups like the Audio Video Transport (AVT) group, the MBone Deployment (MBONED) group, Source Specific Multicast (SSM) group, the Inter-Domain

Multicast Routing (IDMR) group, the Reliable Multicast Transport (RMT) group, the Protocol Independent Multicast (PIM) group, etc. I have also served as a member of the Multicast Directorate (MADDOGS), which oversaw the standardization of all things related to multicast in the IETF. Finally, I was the Chair of the Internet2 Multicast Working Group for seven years.

14. My involvement in the research community extends to leadership positions for several academic journals and conferences. I am the co-chair of the Steering Committee for the ACM Network and System Support for Digital Audio and Video (NOSSDAV) workshop and on the Steering Committees for the International Conference on Network Protocols (ICNP), ACM Sigcomm Workshop on Challenged Networks (CHANTS), and IEEE Global Internet (GI) Symposium. I have served or am serving on the Editorial Boards of IEEE/ACM Transactions on Networking, IEEE Transactions on Mobile Computing, IEEE Network, ACM Computers in Entertainment, AACE Journal of Interactive Learning Research (JILR), and ACM Computer Communications Review. I have co-chaired a number of conferences and workshops including the IEEE International Conference on Network Protocols (ICNP), IEEE Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON), International Conference on Communication Systems and Networks (COMSNETS), IFIP/IEEE International

Conference on Management of Multimedia Networks and Services (MMNS), the International Workshop On Wireless Network Measurement (WiNMee), ACM Sigcomm Workshop on Challenged Networks (CHANTS), the Network Group Communication (NGC) workshop, and the Global Internet Symposium, and I have served on the program committees for numerous conferences. Further, I am a Member of the Association of Computing Machinery (ACM) and a Fellow of the Institute of Electrical and Electronics Engineers (IEEE).

15. Furthermore, in the courses I taught at UCSB, a significant portion of my curriculum covered aspects of the Internet and network communication including the physical and data link layers of the Open System Interconnect (OSI) protocol stack, and standardized protocols for communicating across a variety of physical media such as cable systems, telephone lines, wireless, and high-speed Local Area Networks (LANs). The courses I have taught also cover most major topics in Internet communication, including data communication, multimedia encoding, and mobile application design. My research and courses have covered a range of physical infrastructures for delivering content over networks, including cable, Integrated Services Digital Network (ISDN), Ethernet, Asynchronous Transfer Mode (ATM), fiber, and Digital Subscriber Line (DSL). A complete list of courses that I have taught is included in my CV. (EX1011).

16. In addition, I co-founded a technology company called Santa Barbara Labs that was working under a sub-contract from the U.S. Air Force to develop very accurate emulation systems for the military's next generation internetwork. Santa Barbara Labs' focus was in developing an emulation platform to test the performance characteristics of the network architecture in the variety of environments in which it was expected to operate, and, in particular, for network services including IPv6, multicast, Quality of Service (QoS), satellite-based communication, and security. Applications for this emulation program included communication of a variety of multimedia-based services, including video conferencing and video-on-demand.

III. LEGAL STANDARDS

17. In forming my opinions and considering the subject matter of the '544 patent and its claims in light of the prior art, I am relying on certain legal principles that counsel in this case explained to me. My understanding of these concepts is summarized below.

18. I understand that the claims define the invention. I also understand that an unpatentability analysis is a two-step process. First, the claims of the patent are construed to determine their meaning and scope. Second, after the claims are construed, the content of the prior art is compared to the construed claims.

19. I understand that a claimed invention is unpatentable when it is not new, not useful, or not non-obvious in light of the “prior art.” That is, an invention, as defined by the claims of the patent, must not be anticipated by or rendered obvious over the prior art.

A. Claim Construction

20. I understand that the United States Patent and Trademark Office interprets claim terms in an *inter-partes* review proceeding under the same claim construction standard that is used in a United States Federal Court. I understand that under this standard, the meaning of claim terms is considered from the viewpoint of one of ordinary skill in the art at the time of the alleged invention.

21. I understand that claim terms are generally given their ordinary and customary meaning as understood by one of ordinary skill in the art in light of the specification and the prosecution history pertaining to the patent. I understand, however, that claim terms are generally not limited by the embodiments described in the specification.

22. I understand that in addition to the claims, specification, and prosecution history, other evidence may be considered to ascertain the meaning of claim terms, including textbooks, encyclopedias, articles, and dictionaries. I have been informed that this other evidence is often less significant and less reliable than

the claims, specification, and prosecution history.

B. Anticipation Under 35 U.S.C. § 102

23. I understand that under 35 U.S.C. § 102, a patent claim is invalid if its subject matter was patented or described in a printed publication before the effective filing date of the claimed invention. I have been told that this concept is referred to as invalidity by anticipation. I have been told that a patent claim is anticipated under § 102 if a single prior art reference discloses all limitations of the claimed invention.

C. Obviousness Under 35 U.S.C. § 103

24. I understand that a patent claim is invalid as obvious if the claimed invention would have been obvious to a person of ordinary skill in the art (“POSITA”) at the time the claimed invention was made. I have been told that this means that even if all of the elements of the claim cannot be found in a single prior art reference that would anticipate the claim, a person of ordinary skill in the field who knew about all the prior art would have come up with the claimed invention. I understand that in an obviousness determination, the person of ordinary skill in the art is presumed to have knowledge of all material prior art. I understand that whether a claim is obvious is based upon the determination of several factual issues.

25. I understand that obviousness is a determination of law based on underlying determinations of fact. I understand that these factual determinations include the scope and content of the prior art, the level of ordinary skill in the art,

the differences between the claimed invention and the prior art, and secondary considerations of non-obviousness.

26. In considering obviousness, I understand that one must determine the scope and content of the prior art. I understand that, in order to be considered as prior art to a patent being considered, a prior art reference must be reasonably related to the claimed invention of that patent. I have been told that a reference is reasonably related if it is in the same field as the claimed invention or is from another field to which a person of ordinary skill in the art would look to solve a known problem.

27. I understand that one must determine what differences, if any, existed between the claimed invention and the prior art.

28. I understand that a patent claim composed of several elements is not proved obvious merely by demonstrating that each of its elements was independently known in the prior art. In evaluating whether such a claim would have been obvious, I understand that one may consider whether a reason has been identified that would have prompted a person of ordinary skill in the art to combine the elements or concepts from the prior art in the same way as in the claimed invention. I have been told that there is no single way to define the line between true inventiveness on the one hand (which is patentable) and the application of common sense and ordinary skill to solve a problem on the other hand (which is not patentable). For example,

market forces or other design incentives may be what precipitated a change, rather than true inventiveness.

29. I understand that whether a prior art reference renders a patent claim unpatentable as obvious is determined from the perspective of a person of ordinary skill in the art at the time of the alleged invention. I have been told that there is no requirement that the prior art contain an express suggestion to combine known elements to achieve the claimed invention, but a suggestion to combine known elements to achieve the claimed invention may come from the prior art, as filtered through the knowledge of one skilled in the art. In addition, I have been told that the inferences and creative steps a person of ordinary skill in the art would employ are also relevant to the determination of obviousness.

30. I understand that there is no rigid rule that a reference or combination of references must contain a “teaching, suggestion, or motivation” to combine references. But I also understand that the “teaching, suggestion, or motivation” test can be a useful guide in establishing a rationale for combining elements of the prior art. I have been told that this test poses the question as to whether there is an express or implied teaching, suggestion, or motivation to combine prior art elements in a way that realizes the claimed invention, and that it seeks to counter impermissible hindsight analysis.

31. I understand that one may consider, e.g., whether (1) the change was merely the predictable result of using prior art elements according to their known functions, or whether it was the result of true inventiveness; (2) there is some teaching or suggestion in the prior art to make the modification or combination of elements claimed in the patent; (3) the claimed innovation applies a known technique that had been used to improve a similar device or method in a similar way; (4) the claimed invention would have been obvious to try, meaning that the claimed innovation was one of a relatively small number of possible approaches to the problem with a reasonable expectation of success by those skilled in the art; (5) the invention merely substituted one known element for another known element in order to obtain predictable results; (6) the invention merely applies a known technique to a known device, method, or product to yield predictable results; or (7) known work in the field may have prompted variations of use of the same inventions in the same or different fields due to market forces or design incentives that would have been predictable to a person of ordinary skill in the art.

32. I understand that any assertion of secondary considerations of non-obviousness must be accompanied by a nexus between the merits of the invention and the evidence offered.

IV. TECHNOLOGY BACKGROUND

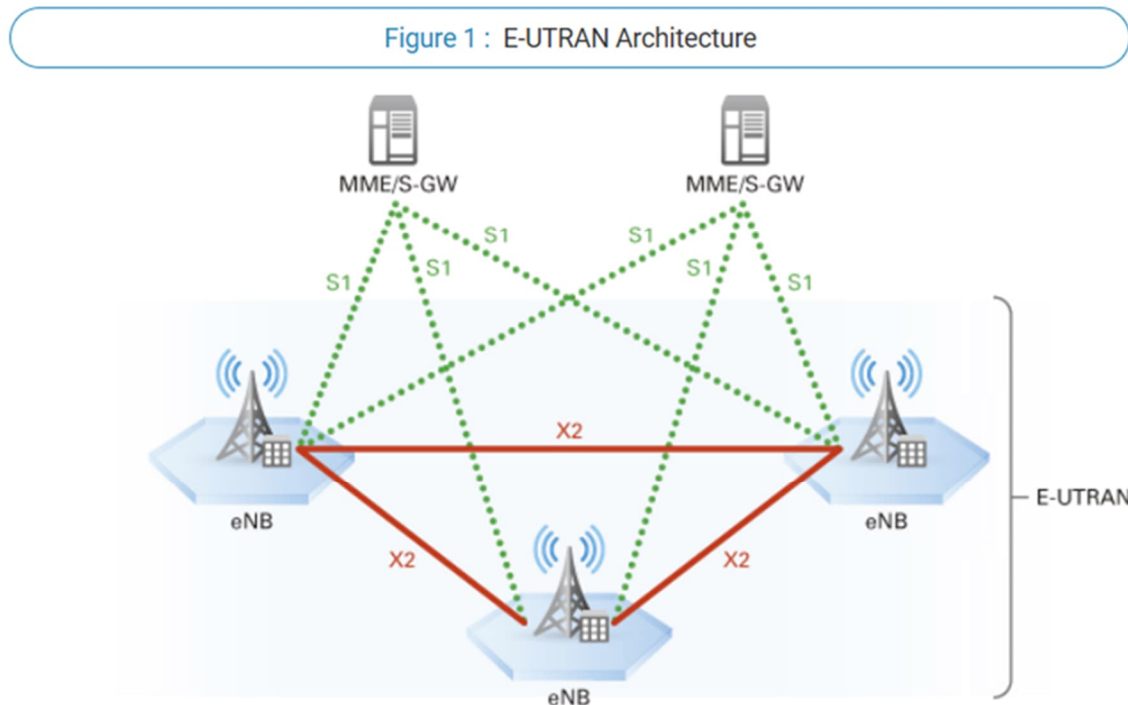
33. I first begin with a summary of the technology disclosed in the '544 patent. The application that led to the '544 patent was filed on November 10, 2015, and claimed priority back to a foreign EP application (EP10162192) dated May 6, 2010. (EX1001 at (30)). Thus, I've been asked to assume for purposes of this declaration that the '544 Patent has a priority date of May 6, 2010. I have not been asked to determine whether that date is the correct date. Moreover, even if the dates shift earlier or later, my opinion would not change that, prior to the May 6, 2010 date listed on the face of the '544 patent, all the technology at issue in the '544 patent was broadly applied and well known by persons of ordinary skill in the art.

34. In my opinion, no individual elements of the '544 patent claims were novel at the time of the alleged invention, and there was nothing novel or inventive about the manner in which those elements were combined in the claims. Further, there were no technological barriers to combining these elements to form the claimed inventions. Indeed, combining these elements would have yielded predictable results.

35. The '544 patent relates to 3GPP LTE (or 3rd Generation Partnership Project Long Term Evolution) network management. 3GPP LTE is a wireless broadband communication standard that provides upgraded mobile data rates and

capacity. First introduced in 2008, LTE technology, among other things, simplified network architecture by consolidating the logic for how a mobile device connects to the cellular network.

36. A standard LTE system architecture generally consists of two parts: (1) an Evolved UMTS Terrestrial Radio Access Network (E-UTRAN) and (2) the System Architecture Evolution (SAE). The E-UTRAN acts as a radio access network and itself comprises multiple components, including “evolved Node B” (eNodeB or eNB) base stations, user equipment (UEs, sometimes also referred to as “terminals”), and the over-the-air radio interface (E-UTRA).

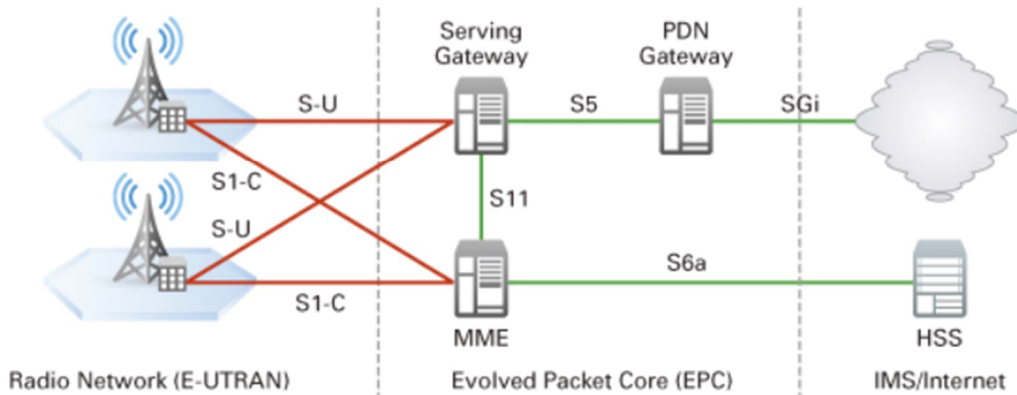


37. eNBs allow UEs (which are essentially any consumer device that can be used to interface with the communication network, such as mobile phones,

laptops, tablets, and computers) to connect to the LTE network by managing the radio interface between the UEs and the core network, facilitating data transmission, and handling network access within designated cell areas. Each eNB has a certain range and covers a specific geographic area called a “cell” and communicates both with the UEs inside the cell and with other eNBs outside of the cell to create a network of overlapping cells that provide seamless coverage across a region. The E-UTRAN also allows eNBs to communicate with and manage other eNBs and UEs, in order to ensure seamless wireless connectivity and efficient data transmission between UEs and the core network. Other functions that may be performed by the E-UTRAN include cell search, handover, power control, and link adaptation.

38. The second part of the LTE network, the SAE builds on the E-UTRAN by providing additional functionalities related to the core network architecture. For instance, the SAE includes management entities and gateways that collectively enable UEs in the E-UTRAN to communicate with external, packet-based networks such as the Internet. At a very generalized level, the SAE acts as the “brains” of the system and is responsible for tasks such as managing user data flow, mobility, and overall network connectivity.

Figure 1 : SAE (System Architecture Evolution)



39. LTE technology is not devoid of negatives however. One of the primary drawbacks of LTE technology is its relatively high-power consumption compared to older cellular technologies like 2G and 3G. This characteristic of LTE is due to the networks' ability to provide increased data transmission speeds and complex network processing schemes required for high bandwidth data transfer. Thus, various solutions have been developed to reduce LTE network power consumption. One known method in the art is to allow network components to be switched on/off or placed in sleep mode in order to shift resources in response to consumer demand, such that devices that are not actively transmitting or receiving data may be disabled.

40. One way this "switching" can be performed as described in the prior art cited in petition and described in this declaration is by using two types of technology simultaneously: (1) "discontinuous transmission" or "DTX"; and (2) "discontinuous reception" or "DRX." DTX technology allows a base station to turn off its

transmitter during periods when no data needs to be sent, essentially “sleeping” when there is no active user traffic, and periodically “waking-up” to transmit necessary data. DRX technology allows a base station to periodically “wake up” from low-power mode to receive new data instead of continuously listening.

41. During these periodic “wake up” intervals, the base station may receive an instruction from the network to return to active operation, which prompts the base station to stay awake until further instruction. Alternatively, if no instructions are received, the base station may return to sleep mode until the next “wake up” interval. By using both DTX and DRX technology, a base station can reduce its energy consumption and electromagnetic radiation emissions.

V. THE '544 PATENT

A. Overview of the '544 patent

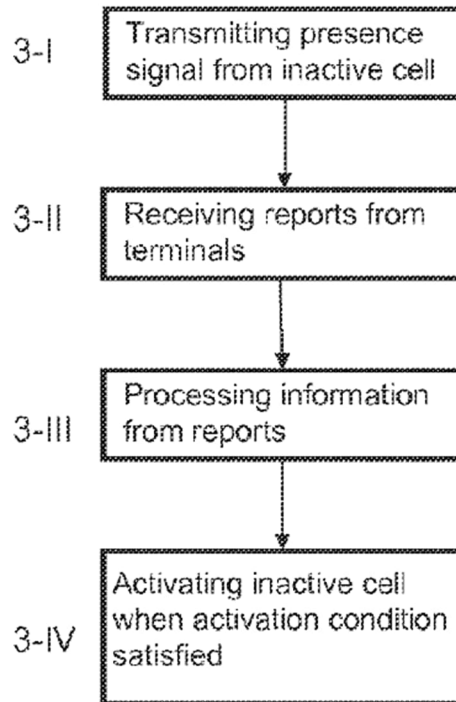
42. Based on my review of the '544 patent, the patent relates to various methods of improving energy conservation and reducing the electromagnetic radiation of a telecommunications network by, as discussed above, allowing the network to selectively wake up certain base stations or cells of the network. (EX1001 at 1:19-24). This network operation is commonly known as “dynamic base switching” and, unlike traditional networks, dynamic switching networks are capable of constantly monitoring their network load in different areas and switching on or off base stations and/or cells as needed to handle varying traffic volumes. By

varying its switching by monitoring real time network traffic, the dynamic switching network can conserve energy by only activating necessary base stations in response to fluctuating demand for the cellular network. (EX1001 at 6:37-41).

43. The '544 patent recognizes that dynamic base switching was well known in the prior art before its filing date. (EX1001 at 1:54-67). For example, the '544 patent's specification discloses two known methods of implementing dynamic base switching that it acknowledges as prior art. (*Id.*). One method is to activate inactive base stations at a certain predetermined time when network traffic is expected to be higher or lower, such as activating more base stations during the day (when demand for telecommunication networks is higher) and activating fewer stations during the night (when demand is lower). (*Id.* at 1:59-63). This process allows the network to conserve power during periods of relative downtime (*e.g.*, evening hours) while maximizing its network performance during periods of high activity. Another method is to activate all inactive cells adjacent to a currently active cell when the active cell detects a rising traffic load or a traffic load which surpasses a certain threshold. (*Id.* at 1:64-67). This process allows a network to respond to demand requirements in real-time.

44. The '544 patent purports to improve on these methods by “determining more accurately which base stations and/or cells should be activated.” (EX1001 at

2:1-3). The method disclosed and claimed in the '544 patent includes an inactive cell that “transmit[s] [a] presence signal . . . to allow the terminals in the active cell to perform measurement on these inactive cells and to report such measurements to the network.” (*Id.* at 5:07-11). The '544 patent's specification recognizes that the terminals may measure these presence signals at certain time intervals, such as by using the “idle period provide by discontinuous reception (DRX).” (*Id.* at 22:52-61). Subsequently, the active cells of the network report the measurements performed by those terminals to the network. (*Id.* at 10:38-40.) One component of the presence signal transmitted by the inactive cell may be a “reporting identifier” which, when transmitted alongside the measurement report to the telecommunications network by the active cell, may be used by the network to “distinguish between reports from terminals related to normal handover...and reports from terminals reporting information about the inactive cells for assessing whether the inactive cell should be activated.” (*Id.* at 8:13-23). Figure 3 of the '544 patent depicts the disclosed method:



(EX1001 at Fig. 3).

B. Prosecution History

45. I have reviewed the prosecution history of the application that led to the '544 patent. (EX1002). I have provided a summary below of the prosecution history.

46. The application that led to the '544 patent was filed on November 10, 2015, and claimed priority back to a foreign EP application (EP10162192) dated May 6, 2010. (EX1001 at (30)).

47. When the application was filed, the original claim 16 (which became claim 1 of the issued patent) did not contain the limitations related to a “reporting identifier” as disclosed in the '544 patent. (EX1002 at Original Claims (Nov. 10, 2015), p. 40)) The examiner rejected this original claim 16 as anticipated by Frenger

(EX1004), finding that Frenger disclosed the 544 patent's claimed network structure as disclosed in claim 16 (*i.e.*, a wireless access telecommunication infrastructure comprising an active cell and at least one inactive cell). (EX1002 at CTNF (Jan. 20, 2016), pp. 3-5). The examiner further rejected claim 16 on the basis that Frenger also taught the 544 patent's claimed steps of receiving in the active base station 'measurement parameters and/or reporting parameters to obtain information regarding a presence signal" from the inactive base station, receiving measurement and reporting parameters to obtain information regarding the presence signal from the inactive base station, and measuring and providing a measurement report to the network via the active base station. (*Id.* at pp. 3-4).

48. As a result of these rejections, the applicant of the '544 patent proceeded to amend the claim to include the additional limitations of a "reporting identifier" (*Id.* at Response to January 20, 2016 Office Action (June 17, 2016), pp. 2-3). These reporting identifier limitations are described in the petition and in this declaration as claim limitations 1[f]-1[h]. Based on these amendments, the examiner allowed the '544 patent on the basis that the prior art of record did not disclose the "reporting identifier" limitations. (*Id.* at Notice of Allowance (June 27, 2016), p. 2).

VI. GROUNDS

49. In the analysis that follows, I identify the following combinations of prior art that, in my opinion, anticipate and/or render obvious the '544 patent claims:

Ground	Basis	Reference(s)	Claim(s)
1	§103	Frenger, Fischer, Hurst	1
2	§103	Nylander, Kim, Lin	1

VII. LEVEL OF ORDINARY SKILL IN THE ART

50. I have been informed that patentability must be analyzed from the perspective of “one of ordinary skill in the art” in the same field as the '544 patent at the time of the invention. As previously discussed, the relevant time of invention is the patent’s priority date, which is no earlier than May 6, 2010. Moreover, I understand that whether or not a patent application provides “written description” support for patent claims must also be assessed from the perspective of a person of ordinary skill in the art.

51. I have also been informed that several factors are considered in assessing the level of ordinary skill in the art, including (1) the types of problems encountered in the art; (2) the prior art solutions to those problems; (3) the rapidity with which innovations are made; (4) the sophistication of the technology; and (5) the education level of active workers in the field.

52. Based on the above, it is my opinion that a person of ordinary skill in the art (“POSITA”) at the time of the ’544 patent would have had at least a Bachelor of Science degree in electrical engineering, computer engineering, computer science, physics, or an equivalent field, and at least two years of experience with cellular telecommunications, radio-access network architectures and protocols, and signal propagation in wireless networks. Additional education can supplement practical experience and vice versa. A person of ordinary skill in the art would also be able to understand and apply the prior art discussed herein.

53. Although I surpass this definition of one of ordinary skill in the art now and at the priority date of the ’544 patent, my analysis regarding the ’544 patent has been based on the perspective of one ordinary skill in the art as of the priority date of the ’544 patent.

54. I am also familiar with the knowledge of the person of ordinary skill in the art as of the priority date of the ’544 patent. I am able to opine on how the person of ordinary skill in the art would have understood the disclosure and claims of the ’544 patent, the disclosures of the prior art, the motivation to combine the prior art, and what combinations would have been obvious to one of ordinary skill in the art.

VIII. CLAIM CONSTRUCTION

55. As I discussed above, I have been informed that for purposes of *inter-partes* reviews, the standard for claim construction of terms within the claims of the patent is the same as that applied in federal district court litigation. I have been asked to assume that the claim terms otherwise have their plain and ordinary meaning to a person skilled in the art in light of the specification and the prosecution history.

56. At this time, I am not aware of any term that requires specific construction for my opinions. To the extent Patent Owner suggests a narrow construction for a term, I reserve the right to respond to those opinions.

IX. GROUND 1: CLAIM 1 IS OBVIOUS OVER FRENGER IN VIEW OF FISCHER AND HURST

57. I provide a summary of this ground as follows. As discussed above, Frenger teaches an LTE network infrastructure with multiple components, including: a terminal, at least one active base station, and at least one inactive base station. Based on my review of the reference, Frenger's terminal is capable of receiving certain necessary signals (which a POSITA would have recognized as forms of a presence signal) from the inactive base station and performing measurements on them. The terminals subsequently report these measurements back to the communication network.

58. A POSITA would have understood Fischer to provide additional instruction on how the network components conduct these measurement and reporting processes, such as how the parameters are determined for each process. For instance, Fischer teaches that, before the terminals measure and report the information, Fischer's terminal may also receive specific parameters which would instruct the terminal on factors such as how and when to measure the signal information and compile said measurements into a measurement report.

59. Finally, a POSITA would have also understood Hurst to provide additional information regarding how a reporting identifier, such as a DTX flag, are one of the additional types of information that could be included in the measurement report. A POSITA would have also understood that these reporting identifiers (and the subsequent measurement reports containing said identifiers) could be used for a variety of purposes besides merely for handover, including RF Quality of Service (QoS) monitoring, network optimization, and geographic location determinations. (EX1006 at [0006], [0028]-[0032]; FIG. 4).

60. Based on these teachings and as discussed in further detail below, it is my opinion that a POSITA would have been motivated to combine the teachings of Frenger, Fischer, and Hurst to arrive at claim 1 of the '544 patent.

A. Overview of Prior Art

61. Below, I discuss the references I rely on in my declaration.

1. Frenger (US 2012/0094661)

62. It is my understanding that the PCT application that published as Frenger was filed on February 13, 2009, and published on April 19, 2012. I further understand that Fischer is prior art to the '544 patent.

63. Frenger generally discloses methods and inventions directed towards “controlling energy of a wireless network node, such as a base station.” (EX1004 at [0001]). And although Frenger primarily focuses on LTE systems and base stations, it notes that the “the same principles may also be used in other systems, such as WCDMA or GSM systems.” (*Id.* at [0022], [0023] (“the present invention will primarily be described with reference to base stations, especially LTE base stations”).

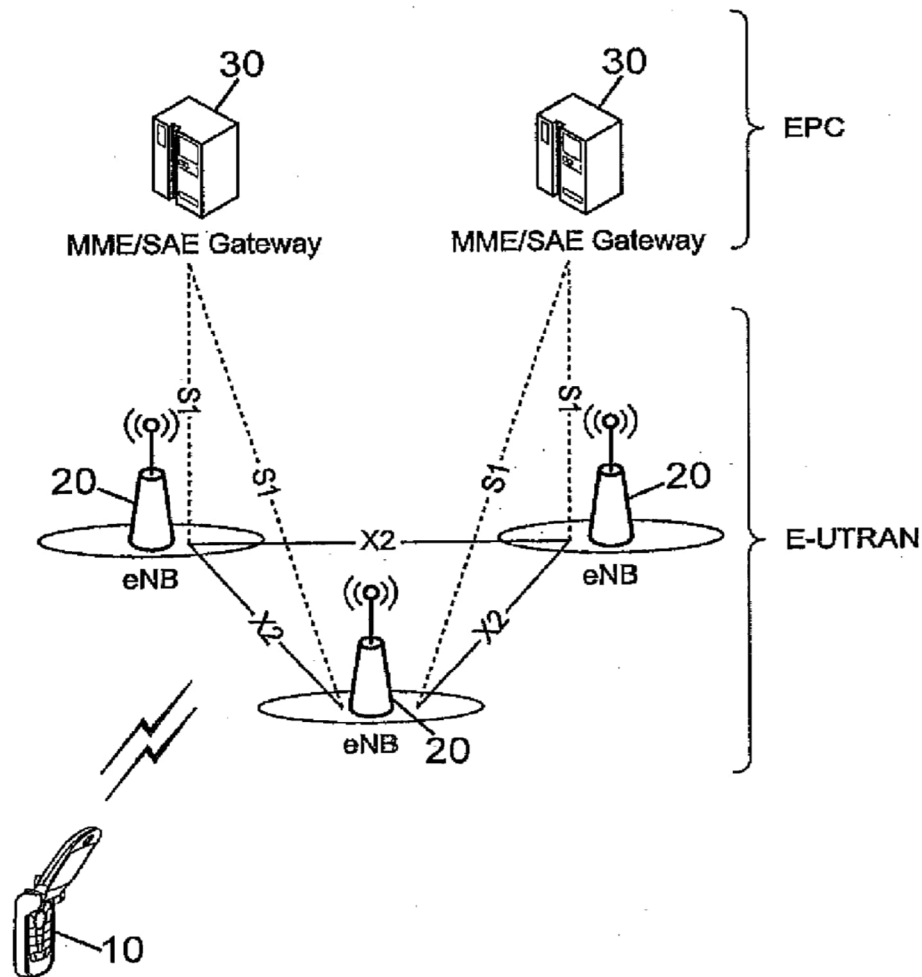
64. Frenger teaches “restrict[ing] transmission downlink in the cell during time periods when there are no active terminals served by the cell,” (*id.* at Abstract), and “wak[ing] up” the base station when a terminal enters the idle cell, (*id.* at [0034]). Frenger’s terminal is able to find the idle cell by searching for, and detecting, certain necessary signals for mobility and cell search that the idle base station intermittently transmits according to a Discontinuous Transmission (DTX) cycle. (*Id.* at [0034]-[0035]). A POSITA would have recognized these necessary

signals as presence signals, and Frenger discloses a variety of different types of said signals, including “reference (pilot) signals, synchronization signals, and broadcasted system information.” (EX1004 at [0052]).

2. Fischer (US 2009/0247150)

65. It is my understanding that Fischer was filed on January 7, 2009 and published on October 1, 2009. I further understand that Fischer is prior art to the '544 patent.

66. Fischer generally discloses a “configuration of measurements and their reporting from wireless devices in a cellular communications network.” (EX1005 at [0003]). Fischer also discloses that its teachings are used “in the context of an LTE (‘long term evolution’) type of cellular network for illustration purposes and because it happens to be well suited to that context.” (*Id.*). FIG. 1 of Fischer provides a general representation of its teachings regarding a “network structure of an evolved universal mobile telecommunication system (E-UMTS) . . . , [which] may be also referred to as an LTE system.”



67. In Fischer, terminals (which a POSITA would have understood to be a mobile phone or any other device capable of communicating with a network) perform measurements on presence signals received from a base station, (EX1005 at [0003], [0066] (“the UE is able to perform different kinds of measurement on received signals such as, for example, evaluating a reference signal received power (RSRP) or a reference signal received quality (RSRQ)”)), and generate and transmit measurement reports based on measurement configuration data, (*id.* at [0045]). Fischer defines “measurement configuration data for a given UE” as data which

includes “measurement identity (ID) elements, measurement object elements and reporting configuration elements.” (*Id.* at [0025]).

3. Hurst (US 2006/0116120)

68. It is my understanding that Hurst was filed on September 21, 2005 and published on Jun. 1, 2006. I further understand that Hurst is prior art to the '544 patent.

69. Hurst is directed towards synchronized signal measurement reports in a mobile telecommunications network. (EX1006 at [0001]). Based on my review, Hurst's network includes components which are capable of utilizing Discontinuous Transmission (“DTX”) cycles to conserve power. (*Id.* at [0005], [0027]). A “DTX cycle” refers to a period of time in a communication system where a device, like a mobile phone, periodically transmits data only when necessary, essentially taking "breaks" from continuous transmission to save energy.

70. When a mobile station “has nothing to transmit,” Hurst discloses that the station can periodically transmit a DTX flag (also known as the “DTXd”) which indicates “whether it has used DTX on the downlink during the measurement period.” (*Id.* at [0005]). Hurst also discloses that other network components, such as terminals, can measure this DTX flag, along with other characteristics such as “signal level and bit error rate,” and then transmit this measurement information in

a measurement report to the telecommunications network. (*Id.* at [0027]-[0028]). And “[a]lthough the primary intention of the measurement reports . . . is to enable decisions on handovers between cells,” Hurst notes that “these reports are useful for other purposes” other than handover, including “in applications such as RF Quality of Service (QoS) monitoring, network optimisation, and calculating the geographic locations of an MS.” (*Id.* at [0006], [0028]-[0032]; FIG. 4).

B. Motivation to Combine

71. A POSITA would have been motivated to combine the teachings of Frenger, Fischer, and Hurst to arrive at claim 1 of the ’544 patent for at least the following reasons.

72. **First**, the ’544 patent and the asserted references are all analogous art because they are generally directed towards the same network communication technology field of art, and involve similar technological components and address similar issues. For example, all of the prior art references and the ’544 patent all involve communication between terminals and base stations in a wireless telecommunication network. (*See, e.g.*, EX1001 at 10:30-56; EX1004 at [0034], FIG. 1; EX1005 at [0007]-[0008]; EX1006 at [0026]). The ’544 patent and each reference involve wireless communication networks which comprise a wireless device such as “mobile station” (“MS”), a “terminal” or, “user equipment” (“UE”)

which measures signals transmitted from a base station (which may be known by different names such as a “NodeB,” “eNodeB,” or “access point.”)

73. The ’544 patent and each reference also discloses various protocols and methods for reporting information derived from the measured signals to the network so that it can make certain decisions, such as activation, handover, system monitoring, and/or network optimization, etc. The terminals of the ’544 patent are capable of measuring signals from an idle base station and reporting said measurements to the network, just like what is disclosed in the prior art references Frenger and Hurst. (*Compare* EX1001 at claim 1 *with* EX1004 at [0030], [0034]-[0035] and EX1006 at [0003]-[0005]).

74. **Second**, the prior art references also address the same problems and propose similar solutions to what is taught by the ’544 patent. For example, the ’544 patent and the prior art references all note the problem of energy consumption. The ’544 patent states that its objective is to “reduc[e] energy consumption,” (EX1001 at 1:19-24) because “energy is considered as a significant part of the operation expenses of a cellular network,” (*Id.* at 1:43-47). Frenger also states that “[e]nergy consumption has long been an important issue for mobile terminals in cellular systems” (EX1004 at [0002]), and addresses this issue by using terminals to measure base station signals while the base station is idling (*i.e.*, employing Discontinuous

Transmission (“DTX”) and Discontinuous Reception (“DRX”) cycles to reduce energy consumption) in order to determine whether or not the base station needs to be reactivated. (*See, e.g.*, EX1004 at [0030], [0035]-[0038]). Hurst also discloses using DTX cycles to conserve power by teaching the use of synchronizing DTX indication flags with corresponding signal measurements to prevent erroneous measurement results. (EX1005 at [0005], [0027]). And Fischer discloses providing consistent signal measurements through the use of measurement configuration requirements to the terminal to manage the measuring process. (EX1005 at [0038], [0079]).

75. ***Third***, a POSITA would have been motivated to combine the teachings of Frenger in view Fischer and Hurst because Frenger’s solution relies on its terminals being able to provide accurate and consistent signal measurements to the network. And as Fischer and Hurst both teach various ways of improving signal measurement consistency and accuracy through different terminal configuration and synchronization methods, a POSITA would have known to combine the teachings in these references with Frenger’s telecommunications network to allow for more effective detection and accurate measurements. (*See, e.g.*, EX1004 at [0003]; EX1006 at [0027]).

76. A POSITA would have understood that Frenger was concerned with obtaining accurate measurements on the presence signals from its terminal. Frenger discloses an inactive base station that emits “reference signals and synchronization signals” (which would have been understood by a POSITA to be different types of presence signals). (EX1004 at [0034]). Frenger’s UEs are capable of “find[ing] the cell and measur[ing] the signal strength” using these presence signals (EX1004 at [0061]). Frenger also teaches that the use of both synchronization and reference signals is preferred because, although just using synchronization signals alone could suffice for this purpose, such an implementation would result in less effective network operation because “synchronization channels are not primary designed” for measurement purposes and “the accuracy of such measurements would be slightly lower.” (*Id.*) As such, a POSITA would have understood Frenger’s teachings to recommend “transmit[ting] both synchronization signals as well as reference signals” in order to make the most accurate measurement possible. Thus, it is my opinion that a POSITA would have understood from this disclosure that Frenger is concerned with obtaining accurate measurements.

77. In order to improve the accuracy of the measurements taken by the system in Frenger, it is my opinion that a POSITA would have looked to analogous art like Fischer. This is because Fischer discloses various ways of improving a UE’s

ability to take measurements on a signal, including by: (1) instructing a UE to begin taking measurements, (2) specifying the types of measurements that a UE could perform on a presence signal, and (3) instructing a UE on how to organize the format in which the measurements are reported. (EX1005 at [0090] (disclosing a terminal that receives measurement and/or reporting instructions), [0072] (disclosing instructions and reporting format indicating what information the terminal must include in the measurement report), and [0066] (disclosing the different kinds of measurement that a terminal can conduct on a received signal)).

78. Besides improving the accuracy of the terminals' measurement and reporting capabilities, Fischer also teaches that implementing such a measurement system improves the consistency and efficiency of communications between the terminals and base stations. (*Id.* at [0038], [0098] (“[terminal] 10 [] contains a consistent set of measurement configuration data, and it can perform measurements in accordance with the regular procedure”)) Fischer also teaches providing a measurement report using an active base station, which is consistent with the energy conservation goals of Frenger and Hurst. (EX1005 at [0040] (disclosing that active base station (BS2) can send a wake up command to base station (BS1) over a base station interface). A POSITA would have understood that, by using an active base station to provide the measurement report as taught by Fischer, the network

architecture could save additional power by not having to turn on additional inactive terminals in order to provide the report to the network. Thus, by implementing Fischer's measurement report generator within Frenger's terminals, a POSITA would have developed a system that could more efficiently measure presence signals and organize the results into Fischer's disclosed format to deliver consistent and accurate reports for transmission to the network.

79. **Fourth**, a POSITA would have also been motivated to additionally implement Hurst's DTX flag (known as "DTxd") to be received by the terminal taught by the combination of Frenger and Fischer. This is because Hurst, like Frenger and Fischer, also discloses the use of a measurement report and various improvements to the accuracy of said report. For instance, Hurst's network system includes a terminal (12) that obtains and provides the measurement report. (EX1006 at [0026] ("MS 12 also measures the strength of signals being received . . . from BTS 16 in neighbouring cells" and "[t]he measurements made by the MS 12 are transmitted to the TRX 18 [of the base station].")). Hurst also teaches the sending of a measurement report from a terminal (MS) to the telecommunications network infrastructure, which is done through "an active mobile station (MS) mak[ing] repetitive signal level and bit error rate [(quality)] measurements on the 'downlink' signal received from the serving cell base transceiver station (BTS)," which the BTS

then puts “into a Measurement Report” that is sent “to the base station controller (BSC).” (EX1006 at [0002], [0005] [0026]).

80. Hurst also would inform a POSITA on *how* to measure the signals, such as whether the terminals should use a FULL level measurement or a SUBSET level measurement when analyzing the presence signals in order to utilize the most accurate measurement technique. (EX1006 at [0005]). And modification to the terminal as taught by the combination of Frenger and Fischer to receive a DTX flag would have been obvious because these two references already disclose using DTX and/or DRX cycles. (*See e.g.*, EX1001 (Frenger) at [0035] (“the signals necessary for mobility and cell search should be intermittently transmitted”); EX1002 (Fischer) at [0021] (“the UE 10 may receive broadcasts of system information and paging information while the UE specifies a Discontinuous Reception (DRX)”).

81. A POSITA would have understood Hurst to teach that if a base station is in DTX mode when measurements are being taken, “[t]he use of DTX during a measurement period clearly affects the signal level measured by the receiving entity.” (EX1006 at [0004]). Based on this effect, Hurst teaches the use of two different levels of measurement depending on whether or not DTX is being used: “[i]f DTX has been used on the downlink then the SUBSET level measurement from the [terminal] should be used; if DTX has not been used on the downlink then the

FULL level measurement from the [terminal] should be used.” (EX1005 at [0004]). As such, a POSITA would have understood Hurst to disclose that FULL level measurements are used to measure all transmissions on the traffic channel and SUBSET level measurements are used to measure only the mandatory transmissions (*e.g.*, presence signals) coming from the components which are currently utilizing a DTX cycle.

82. Critically, a POSITA would have known, based on Hurst’s teachings, that using “FULL level measurement” to measure a network component that is in a DTX cycle “will be wrong if DTX has been used.” (*Id.* at [0003]). And because Frenger and Fischer both disclose using DTX and/or DRX, a POSITA would know to include Hurst’s DTXd reporting identifier in the measurement report to the Frenger and Fischer network so that the network could be informed on whether or not DTX is being used by one or both nodes in order to conduct accurate measurements. (*See e.g.*, EX1004 at [0035] (“the signals necessary for mobility and cell search should be intermittently transmitted”); EX1005 at [0021] (“the UE 10 may receive broadcasts of system information and paging information while the UE specifies a Discontinuous Reception (DRX)”)). Thus, because a network’s knowledge of whether or not DTX was used during a signal transmission is necessary for obtaining the most accurate measurements and measurement reports

on the various components., it is my opinion that a POSITA would have been motivated to add Hurst's DTXd flag in the measurement report system of Frenger and Fischer.

C. Reasonable Expectation of Success

83. In my opinion, a POSITA would have had a reasonable expectation of success when combining Frenger, Fisher, and Hurst to arrive at the patented claims because the modifications entail a straightforward software implementation that was well within the knowledge and capability of a skilled artisan. A POSITA would have known that programming a known system to perform certain well understood functions would have yielded a predictable result at least given the similarity of the systems to which those techniques were being applied. As Frenger explains, for terminals to execute the functionalities taught by its disclosure, one only needs to implement firmware updates. (EX1004 at [0054], [0058]).

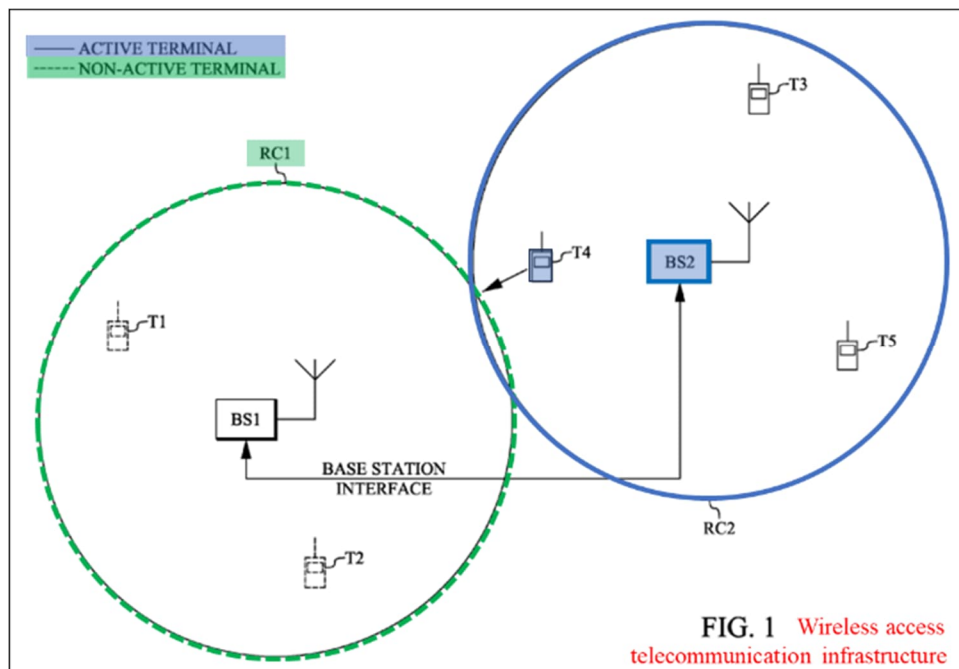
84. Thus, a POSITA at the time of the '544 patent would have understood that Frenger's terminals could be programmed to receive a variety of different types of information, including measurement parameters, reporting parameters, and a reporting identifier from base stations, as disclosed in, for example, Fischer and Hurst.

D. Claim 1

1. 1[pre]: “A terminal configured for operating in a wireless access telecommunication infrastructure comprising an active base station and at least one inactive cell, wherein the terminal comprises:”

85. In my opinion, and to the extent the preamble is limiting, Frenger discloses this limitation.

86. Frenger discloses a terminal (T4) which can operate a wireless access telecommunication infrastructure (illustrated in FIG. 1) that comprises an active base station (BS2) and at least one inactive cell (RC1). (EX1004 at [0033]-[0034]; Fig. 1).



(EX1004 at FIG. 1 (color annotations added) (according to the legend, inactive terminals have dashed outlines and active terminals have with solid outlines)).

2. 1[a]: “a processor for executing instructions that cause the terminal to carry out operations including:”

87. In my opinion, Frenger discloses this limitation.

88. Frenger teaches that its terminals, “such as mobile stations, UEs (User Equipments), laptops, etc.” comprise *a processor* (32). (EX1004 at [0025], [0019] (“FIG. 9 is a block diagram illustrating an embodiment of a radio terminal”). For instance, Frenger teaches that the terminal “may be instructed by a base station to perform measurements” on signals transmitted from the base station covering the idle cell. (*Id.* at [0054]). A POSITA would have understood that processor 32 as described in Frenger is therefore *for executing instructions that cause the terminal to carry out operations* (such as performing measurements).

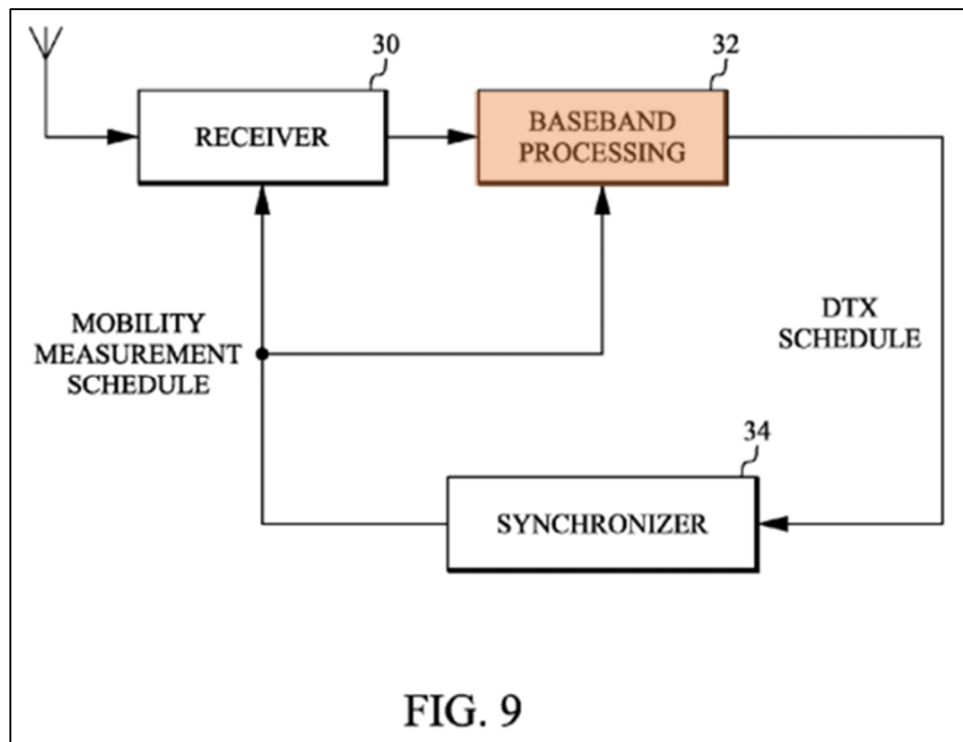


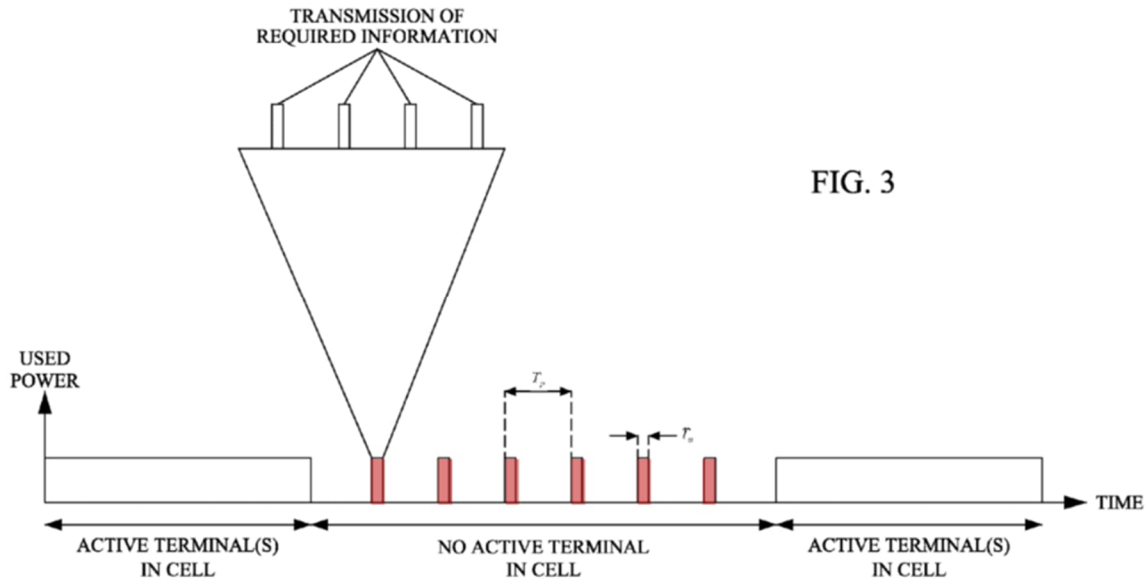
FIG. 9 (color annotations added).

3. **1[b]: “receiving in a transmission from the active base station measurement parameters and/or reporting parameters, wherein the received measurement parameters and/or reporting parameters trigger the terminal to obtain information regarding a presence signal from the at least one inactive base station”**

89. Because this limitation includes two separate requirements, I address them separately below. Nonetheless, it is my opinion that Frenger alone or in view of Fischer renders obvious all aspects of this limitation.

- ***receiving in a transmission from the active base station measurement parameters and/or reporting parameters***

90. Frenger discloses that its active base station is capable of providing measurement parameters to the terminal, such as *when* to perform the measurements. (EX1004 at [0054]-[0055]). According to Frenger, “[a]n active terminal may be instructed by a base station to perform measurements at time instants that lie in time periods.” (*Id.* at [0054], [0056]).



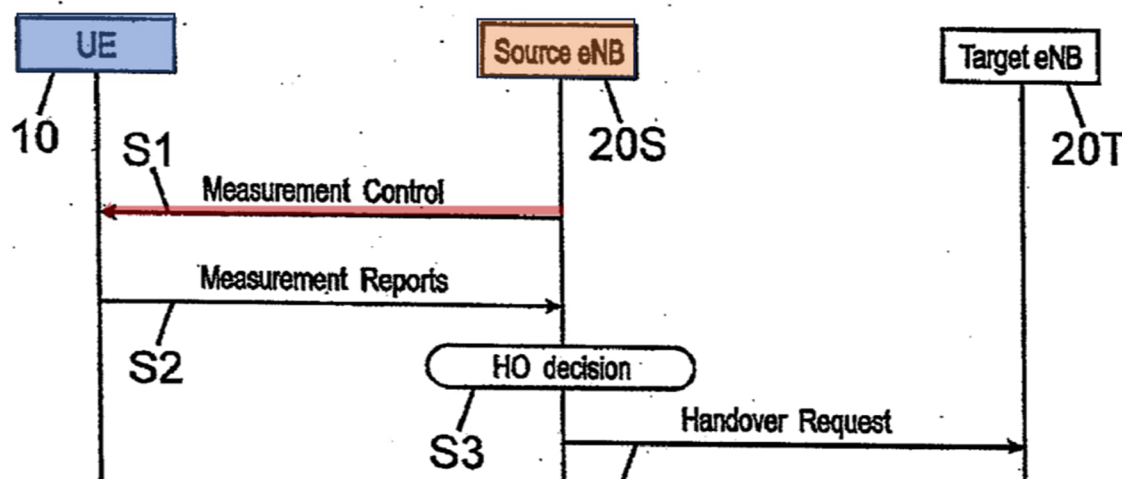
(EX1004 at FIG. 3 (T_a annotated in pink color)).

91. Frenger further teaches that the terminal should be instructed to perform measurements at time period T_a (shown above) so that the terminal can detect signals at the same time as when the idle base stations intermittently transmit presence signals. (*Id.* at [0035] (“Despite being in idle mode, the signals necessary for mobility and cell search should be intermittently transmitted . . . every T_a .”), [0038], FIG. 3). At these times, the terminals can then measure the presence signals from the idle base station which allow the terminals to locate the cells, measure the presence signals transmitted from these inactive cells, and report signal information about these presence signals to the telecommunications infrastructure so that the network can make a decision whether to wake up the idle base station if the terminal moves into the area covered by the idle cell. (See *id.* at [0030], [0034], [0061]

(“UE’s that are not served by the idle eNodeB use these signals [i.e., presence signals] to find the cell and to measure the signal strength.”).

92. Thus, a POSITA would have understood that the base station provides, in a transmission to the terminal, a measurement parameter and/or reporting parameter by informing the terminal when to perform measurements (time periods, T_a).

93. Fischer also discloses this limitation. For instance, Fischer teaches a terminal (10) which receives a transmission from the active base station (20S) containing measurement parameters and/or reporting parameters (i.e., measurement control messages (S1)). (EX1005 at [0090] (disclosing a UE 10 (i.e., terminal) that receives in a transmission from a source eNodeB 20S (i.e., active base station) measurement parameters and/or reporting parameters (i.e., measurement control messages (S1))).).



(*Id.* at FIG. 4 (partial) (color annotations added)).

94. Fischer teaches that “the messages containing MeasurementConfiguration information elements will be referred to [] as MEASUREMENT CONTROL messages.” (EX1005 at [0069]). “A MeasurementConfiguration information element contains a list of measurement IDs . . . to be added or modified, a list of . . . measurement objects to be added or modified, a list of . . . reporting configurations to be added or modified and/or other parameters” (EX1005 at [0069]). “Each reporting configuration element has an identifier . . . , a reporting criterion specifying when the UE must send a measurement report and a reporting format” (EX1005 at [0071]).

- ***wherein the received measurement parameters and/or reporting parameters trigger the terminal to obtain information regarding a presence signal from the at least one active base station***

95. As discussed above, Frenger teaches that its active terminal (UE10) receives a measurement parameter and/or reporting parameter which triggers its terminal to obtain information regarding a presence signal from the at least one inactive base station because the terminal is instructed as to *when* (*i.e.* at time period T_a) to measure the presence signals by the idle base station BS1.

96. Fischer also teaches that the terminal (10) is triggered by the received measurement parameters and/or reporting parameters (S1) to obtain information on a presence signal from the at least one active base station (20S). For instance, Fischer

reporting criterion “specif[ies] when the UE must send a measurement report and a reporting format indicating which quantities the UE must include in the measurement report.” (EX1005 at [0071]). Fischer’s MEASUREMENT CONTROL messages (S1) also include “measurement identity (ID) elements, measurement object elements and reporting configuration elements.” (*Id.* at [0025]). Fisher also teaches that “[t]he measurement report generator 82 accesses the measurement IDs stored in memory 81 to configure the receiver 60 so that it performs the measurements as specified in the measurement objects and related reporting configurations” (i.e., MEASUREMENT CONTROL message).” (EX1005 at [0078]). “[T]he receiver 60 of the UE is able to perform different kinds of measurement on the received signals such as, for example, evaluating a reference signal received power (RSRP) or a reference signal received quality (RSRQ),” (i.e., presence signals). (EX1005 at [0066]).

97. Based on these disclosures and for the reasons described in Section IX.B-C of this declaration, it is my opinion that a POSITA would have been motivated to implement, with a reasonable expectation of success, Fischer’s teachings regarding the measuring of signals and sending of measurement reports according to certain measurement and reporting parameters within the terminal of Frenger. This implementation would have improved the consistency of Frenger’s

network measurement and reporting performance and would have also improved on the efficiency of communication between the terminals and base stations. (EX1005 at [0038], [0098] (“[terminal] 10 [] contains a consistent set of measurement configuration data, and it can perform measurements in accordance with the regular procedure.”))

4. 1[c]: “receiving the presence signal transmitted from the at least one inactive base station;”

98. In my opinion, Frenger discloses this limitation.

99. Frenger teaches presence signals transmitted from the at least one inactive base station. Frenger discloses that “there are three types of information that the idle base station (*i.e.*, inactive base station) may transmit . . . to assist a terminal in finding the cell, namely reference (pilot) signals, synchronization signals and broadcasted system information” (*i.e.*, presence signals). (EX1004 at [0052]). A POSITA would have understood the disclosed signals to be various types of “presence signals” as disclosed by the ’544 patent. (EX1001 at 4:58-64 (“An inactive cell may, during a probing period transmit a presence signal, for example reference symbols . . . , synchronization signal (SCH) and broadcast signal (BCH)”)).

100. Frenger also discloses that its terminal(s) receives the presence signals. For instance, Frenger states that its “[t]erminals regularly scan for neighboring cells”

(EX1004 at [0030]) (*i.e.*, receiving), and when a terminal (T4) moves into an area covered by the idle cell, the terminal “expects certain downlink signals (synchronization signals, reference signals, broadcast channels) (*i.e.*, presence signals) to be present[;] [o]therwise, it would not be able to find the cell.” (EX1004 at [0034]).

5. 1[d]: “obtaining a measurement report regarding the presence signal transmitted from the inactive base station and;”

101. In my opinion, Frenger alone or in view of Fischer discloses this limitation.

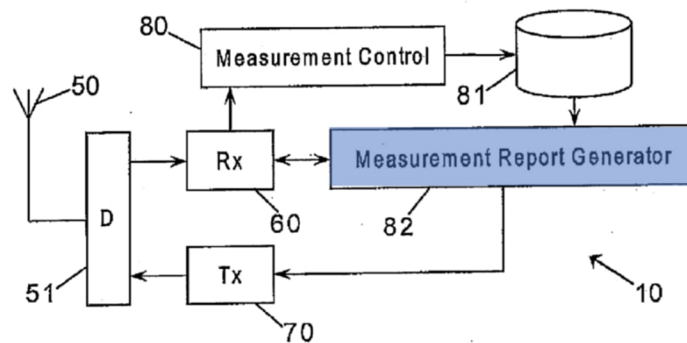
102. As discussed above in this declaration, Frenger discloses that its inactive base stations (BS1) transmit signals (*i.e.*, reference (pilot) signals, synchronization signals and broadcasted system information). Frenger further discloses that even when a base station is in idle mode (*i.e.*, inactive base station), “the signals necessary for mobility and cell search”—e.g., reference signals (which would have been understood by a POSITA to be a type of presence signal)—“should be intermittently transmitted.” (*Id.* at [0034]-[0035]).

103. Frenger further discloses that its terminal (T4) is capable of obtaining a measurement report regarding the presence signals. The “[a]ctive terminals typically [] report the received signal strength of reference signals (RSRP

(Reference Signal Received Power) measurements) transmitted by the neighboring cells to the network.” (EX1004 at [0030]).

104. Fischer also discloses that its terminal (10) can obtain a measurement report via the use of a measurement report generator (82), which compiles the measurement results conducted on a signal (*e.g.*, Reference Signal Received Power (RSRP), Reference Signal Received Quality (RSRQ), or both) into measurement reports. (See EX1005 at [0077]-[0079]). This measurement report generator is included within the functionality of Fischer’s terminal as shown by FIG. 3 which “is a block diagram of a UE.” (*Id.* at [0062]):

FIG 3



EX1005 at FIG. 3 (color annotations added)).

105. Based on these disclosures and for the reasons described in Section IX.B-C of this declaration, it is my opinion that a POSITA would have found it

obvious to combine Frenger's teachings with Fischer with a reasonable expectation of success.

6. 1[e]: “providing the measurement report to the telecommunications infrastructure via the active base station,”

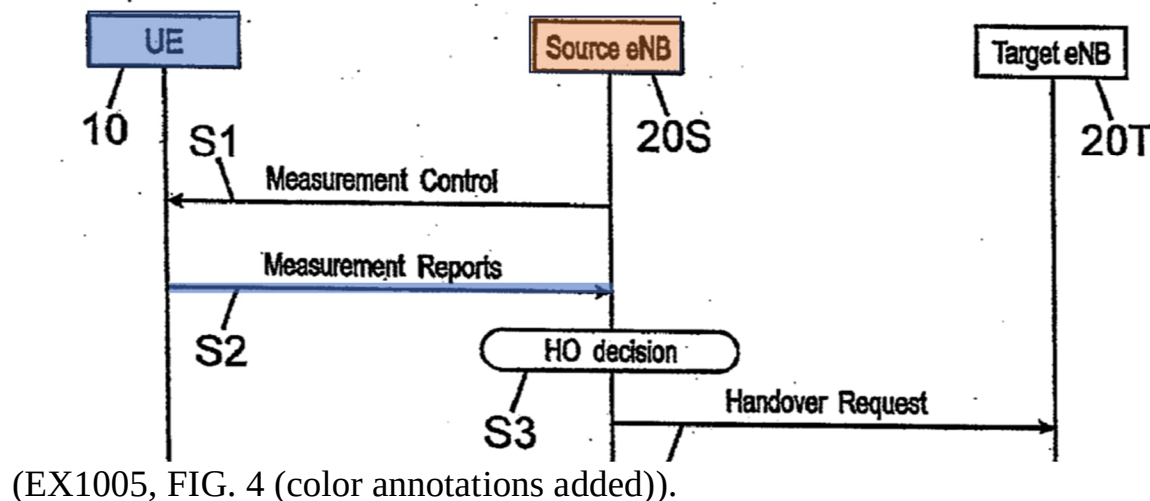
106. In my opinion, Frenger alone or in view of Fischer discloses this limitation.

107. Frenger teaches that the “[a]ctive terminals typically [] **report** the received signal strength of reference signals (RSRP (Reference Signal Received Power) measurements) transmitted by the neighboring cells to the network.” (EX1004 at [0030] (emphasis added)). And because Frenger's active terminal operates within the cell RC2 that is managed by the active base station BS2, a POSITA would have understood that the active terminal could provide the report to the network through BS2.

108. Fischer also teaches this limitation. For example, as discussed earlier for limitation 1[d], Fischer teaches obtaining a measurement report at a terminal. Fischer also teaches that the terminal (10) provides measurement reports (S2) to the network via an active base station (Source eNodeB 20S). (EX1005 at [0090], FIG. 4). For instance, once Fischer's UE receives MEASUREMENT CONTROL messages from the active base station 20S, the “UE 10 is then triggered to send

MEASUREMENT REPORT messages (step S2) according to the rules set by the measurement configuration data.” (*Id.* at [0090]). The UE 10 then transmits the measurement report to the network. (*See id.* at [0067], claim 9 (“trigger a measurement report from the mobile station to the network”). This process is illustrated in FIG. 4 which has been annotated and reproduced below. (EX1005, at [0090] (“The UE 10 is [] triggered to send MEASUREMENT REPORT messages (step S2) according to the rules set by the measurement configuration data.”)).

FIG 4



109. Based on these disclosures and for the reasons described in Section IX.B-C of this declaration, it is my opinion that a POSITA would have found it obvious to combine Frenger’s teachings with Fischer with a reasonable expectation of success.

7. 1[f]: “wherein the operations further include: receiving a reporting identifier transmitted from the inactive base station, the received reporting identifier indicating that the inactive base station is in a probing period;”

110. In my opinion, Frenger in view of Hurst discloses this limitation.

111. Frenger teaches that its active terminal (T4) measures presence signals transmitted from an inactive base station (BS1) operating in Discontinuous Transmission (“DTX”) mode (*i.e.*, probing period). (EX1004 at [0034]-[0038], [0052]-[0054], FIG. 3). Frenger further teaches that, while in DTX mode, the idle base station transmits presence signals “during the time periods T_a .” (*Id.* at [0052] (“idle base station may transmit [presence signals] in DTX mode to assist the terminal in finding the cell”). Frenger’s terminal T4 is instructed to “synchronize the mobility measurements with the intermittent transmission” and “perform measurements at time instants that lie in the time periods T_a of a base station in DTX mode.” (EX1004 at [0054]-[0055]). As explained above in limitation 1[b], a POSITA would have understood this measurement period occurring during T_a as “a probing period” that is equivalent to “[t]he time period from commencing to transmit a presence signal in an inactive cell to the moment a decision is taken on whether or not to activate the inactive cell,” as defined by the ’544 patent. (EX1001 at 3:2-5).

112. Hurst teaches that a base station (BTS), when operating in DTX mode, issues a DTX flag (“DTXd”) (*i.e.*, a reporting identifier) which “indicat[es] whether

it has used DTX on the downlink during the measurement period.” (*Id.* at [0005]). Hurst further teaches that “[t]he use of DTX during a measurement period clearly affects the signal level measured by the receiving entity (MS for the downlink).” (EX1006 at [0003]). Thus, based on these teachings, a POSITA would have known that it was necessary for a network to determine whether or not a base station was operating in operating in DTX (intermittent transmission) or CTX (*i.e.*, continuous transmission) mode, as the operating mode could impact the accuracy of the signal measurements conducted by the terminal. Indeed, Hurst supports this understanding by disclosing that “the FULL measurement will be wrong if DTX has been used on the [traffic channel]” (EX1006 at [0003]).

113. A POSITA would have also known that the actual DTX transmissions are not consistent, and can become misaligned with the predetermined schedule over time. Further, as provided for in Frenger, if a terminal “moves into the area covered by the idle cell, the base station may wake up and resume the transmission activity [*i.e.*, CTX mode]. (EX1004 at [0034]). As such, a POSITA would not solely rely on Frenger’s disclosure of providing the base station’s DTX schedule to terminal T4, (EX1004 at [0056]) as the base station schedule may not have accounted for these misalignments, leading to loss of accuracy in the measurement reports. There was thus a need for the network to be able to correctly account for the transmission status.

114. To address this issue, a POSITA would have been motivated to combine Frenger with Hurst's teaching of "a flag indicating whether it has used DTX on the downlink during the measurement period" (*i.e.*, reporting identifier). (EX1006 at [0005] ("This flag is called DTXd")); As taught by Hurst, because FULL level measurements are measured over all transmissions on the traffic channel and SUBSET level measurements measure only the mandatory transmissions (*e.g.*, presence signals), "the FULL level measurement will be wrong if DTX has been used." (*Id.* at [0003]). Thus, Hurst teaches that "[i]f DTX has been used on the downlink then the SUBSET level measurement from the MS should be used; if DTX has not been used on the downlink then the FULL level measurement from the [terminal] should be used." (*Id.*)

115. Based on these disclosures and for the reasons described in Sections IX.B-C of this declaration, it is my opinion that a POSITA would have found it obvious to combine Hurst's teachings with Frenger and Fischer with a reasonable expectation of success. Specifically, a POSITA would have understood that by allowing Frenger's terminal T4 to determine during each measurement period whether DTX was used, the terminal could reduce the risk of inaccurate analysis by presuming the status of a base station based on a predetermined schedule. A POSITA would have been further motivated to combine these references with a reasonable

expectation of success because the combination informs the terminal about *how* it should measure the signals—*i.e.*, using a FULL level measurement or using a SUBSET level measurement.

8. 1[g]: “recognizing the reporting identifier; and”

116. In my opinion, Hurst discloses this limitation.

117. For Hurst’s terminal (MS) to utilize the DTX flag (DTXd), to perform a FULL or SUBSET level measurement, it must also recognize the DTX flag. (EX1006 at [0003]-[0005])). Thus, as discussed above in Sections IX.B-C, a POSITA would have been motivated, with a reasonable expectation of success, to ensure that the terminal taught by the combination of Frenger, Fischer, and Hurst is configured to recognize DTX flags and schedules.

9. 1[h]: “including the reporting identifier in the measurement report, the included reporting identifier being an indication to the telecommunications infrastructure that the measurement report was not obtained as part of a handover to the inactive base station.”

118. Because this limitation includes two separate requirements, I address them separately below. Nonetheless, it is my opinion that the combination of Frenger, Fischer, and Hurst, discloses this limitation.

• *including the reporting identifier in the measurement report*

119. As discussed above with regard to claim limitation 1[e], Frenger and Fischer teach a terminal that provides a “measurement report” to the

telecommunications network infrastructure. In addition, as discussed with regard to limitation 1[f], Hurst teaches a measurement report that includes a DTX flag “reporting identifier.” (EX1006 at [0027]-[0028]). Specifically, Hurst teaches that “the BTS includes with its uplink measurements . . . a flag [DTXd] indicating whether it has used DTX on the downlink during the measurement period.” (EX1006 at [0005]). Hurst’s “downlink DTXd flag from the BTS 16 is synchronized with the corresponding downlink measurement results from the MS” (EX1006 at [0027]), and such measurements, including DTXd, are “combined by the BTS 16 into a Measurement Report signalling message . . . to the BSC 22.” (EX1006 at [0027]; [0028] (“Measurement Report signalling message . . . contains the BTS uplink measurements and downlink DTXd flag for measurement period.”)).

- ***the included reporting identifier being an indication to the telecommunications infrastructure that the measurement report was not obtained as part of a handover to the inactive base station***

120. The Frenger-Fischer-Hurst combination also teaches that the DTX flag indicates that the measurement report was not obtained as part of a handover to the inactive base station because the DTX flag information would be received by the telecommunications network before any handover decisions are ever made. (EX1006 at [0005]). A POSITA would have also understood that, because handover decisions involve switching from DTX mode to CTX mode, and also because such

a switch does not occur when determining whether a measurement occurred during a DTX probing period, the DTXd flag would not be transmitted as part of a handover. (See EX1004 at [0044] (if a handover request is detected, the base station is instructed “to leave DTX mode, and to enter normal CTX mode.”))

121. As discussed above in Sections IX.B-C and with regard to limitation 1[h], a POSITA would have been motivated to include a DTX flag (*i.e.*, reporting identifier) with the measurement report of the Frenger-Fischer combination, as disclosed in Hurst, with a reasonable expectation of success. A POSITA would also have been motivated, with a reasonable expectation of success, to include a reporting identifier in the measuring report of Frenger that was not obtained as part of a handover to the inactive base station as Hurst explicitly teaches that, “[a]lthough the primary intention of the measurement reports . . . is to enable decisions on handovers between cells, these reports are useful for other purposes,” including “in applications such as RF Quality of Service (QoS) monitoring, network optimisation, and calculating the geographic locations of an MS.” (*Id.* at [0006], [0028]-[0032]; FIG. 4).

X. GROUND 2: CLAIM 1 IS OBVIOUS OVER NYLANDER IN VIEW OF KIM AND LIN

122. I provide a summary of this ground as follows. As discussed above, Nylander discloses a 3G or LTE cellular telecommunication system for “interference

reduction and energy saving.” (EX1007 at [0001]). Nylander’s “mobile telecommunication network comprises macro base stations and at least one Energy Efficient Base Station (EEBS).” (*Id.* at [0014]). The EEBS is configured to enter a “sleep mode, wherein the EEBS transmits its reference signal and system information less frequently than during regular operation.” (*Id.*). A terminal (“UE”) is “allowed to access the at least one EEBS” and “determine[s] an identity of an EEBS in sleep mode” through the use of a prolonged search period which is capable of detecting the sleep mode EEBS’s transmissions. (*Id.* at [0014-15]). The UE also detects “a fingerprint based on transmission from base stations indicating that the UE is in the vicinity of an EEBS” and “send[s] an indication to the mobile telecommunication network that it should wake up the EEBS associated with the determined identity.” (*Id.* at [0015]). Nylander’s UE further comprises “a processor for detecting a fingerprint based on transmissions from base stations . . . [and] for performing a search for EEBSs that the UE is allowed to access” as well as a “transmitter for sending an indication to the mobile telecommunication network that it should wake up the EEBS” (*Id.* at [0021]).

123. A POSITA would have understood Kim to provide additional instruction on how to “report[] measurement information about a serving base station and neighbor base stations in a packet-based communication system,”

(EX1008 at 6:21-25), such as a “3rd-Generation Partnership Project (3GPP) Long Term Evolution (LTE) system. (*Id.* at 2:18-20). Kim discloses a method of using a terminal to “report[] measurement information about a serving base station and neighbor base stations.” (*Id.* at 6:22-24). As Kim discloses, “the base station informs the terminal of the decided DRX/DTX parameter and the measurement information report parameter.” (*Id.* at 17:2-4). “[T]he terminal measures information on the serving cell and neighbor cells at every measurement information report period while executing the DRX/DTX operation based on the parameter set up by the base station, and reports the measured information. (*Id.* at 17:15-19). The measurements include “channel qualities of the serving cells and neighbor cells,” “control signal blocks,” and “radio resources information.” (*Id.* at 21:1-5).

124. Finally, Lin teaches a method of detecting discontinuous transmission (DTX) in a communication system, such as a code division multiple access (CDMA) designed to be supported by one or more CDMA standards such as 3rd Generation Partnership Project (3GPP) (the W-CDMA standard). (EX1009 at 1:11-29). Lin’s system generates a two-dimensional quality metric “using energy per bit to noise power ratio as a first dimension and re-encoded symbol energy may be used as a second dimension of the quality metric.” (*Id.* at 3:34-39). Lin discloses that “a receiver in the MS 130a receives, demodulates, and decodes the signal [from the

base station in DTX mode] in order to recover the data,” and “[t]he DTX detection algorithm uses multiple variables [(i.e., reporting identifiers)] generated from the received signal in order to generate a multi-dimensional signal metric,” (EX1009, 5:33-42), which allows for the generation of the two-dimensional quality metric. Lin further teaches that this multi-dimensional signal metric is used to provide accurate DTX detection. (*Id.* at 11:58-60, 7:34-36).

125. Based on these teachings and as discussed in further detail below, it is my opinion that a POSITA would have been motivated to combine the teachings of Nylander, Kim, and Lin to arrive at claim 1 of the ’544 patent.

A. Overview of Prior Art

1. Nylander (US 2012/0106423)

126. It is my understanding that the PCT application that published as Nylander was filed on June 24, 2009 and published on May 3, 2012. I further understand that Nylander is prior art to the ’544 patent.

127. Nylander discloses “methods for reduction of interference and energy consumption resulting from radio transmissions from base stations” in, for example, a 3G or LTE network system. (EX1007 at [0011], [0002], [0036] (“It should be noted that this example is in the context of . . . an LTE network but . . . the invention is not limited to such a scenario)). Based on my review of the reference, Nylander discloses a cellular network with several components, including: an active, macro

base station and an inactive base station in sleep mode, called a home node (HN) or energy efficient base station (EEBS). (*Id.* at [0002], [0032]-[0033]). Nylander's EEBS, when in sleep mode, is capable of transmitting a "reference signal and system information less frequently than during regular operation, and the UE is allowed to access the at least one EEBS." (*Id.* at [0014]; [0033]). Using an extended search, Nylander's UE may detect the sleeping base station and, based on the needs of the overall communication network, may indicate to the mobile telecommunication network that "the EEBS should wake up from sleep mode and return to regular operation." (*Id.* at [0038], [0048], Fig. 5).

2. Kim (WO 2008/084938)

128. It is my understanding that the PCT application that published as Kim was filed on January 3, 2008 and published in English on July 17, 2008. I further understand that Kim is prior art to the '544 patent.

129. Kim teaches "reporting measurement information about a serving base station and neighbor base stations in a packet-based communication system." (EX1008 at 7:1-5). Based on my review of the reference, Kim is generally related to using a terminal to "measures information on the serving cell and neighbor cells at every measurement information report period . . . based on the parameter set up by the base station, and reports the measured information." (*Id.* at 17:15-19). Kim

also discloses that its measurement teachings can be used in a packet-based cellular network system, such as a 3GPP LTE system. (*Id.* at 2:18-20 (“a 3rd-Generation Partnership Project (3GPP) Long Term Evolution (LTE) system is a packet-based system providing services”)). Kim further teaches that these measurements “should be carried out while the terminal maintains the DRX/DTX periods for power-saving operation,” (*id.* at 9:24-33), and “the terminal . . . should report measurement information at a period related to the DRX and DTX periods to efficiently report the measurement information,” (*Id.* at 8:32-35).

3. Lin (US 6,782,059)

130. Lin was filed on January 31, 2002 and published on August 24, 2004. Accordingly, Lin is prior art under at least 35 U.S.C. § 102(b).

131. Lin teaches a method for detecting discontinuous transmission (DTX) from a base station over a communication channel, such as a CDMA channel. (EX1009, 3:48-50). Specifically, in Lin, a mobile station 130a “receives, demodulates, and decodes” a signal from a base station. (*Id.* at 5:33-35). After decoding, “[t]he decoded bits are coupled to a DTX detector 250,” which uses signal characteristics of the received signal to help determine whether the station is utilizing a DTX cycle. (*Id.*; 7:27-33). Lin also discloses that “[m]ultiple variables are generated from the received signal, including an energy per bit to noise power ratio

and a normalized re-encoded symbol energy. (*Id. at* 5:38-41, 9:8-12). These variables, such as “bit power, noise power, and re-encoded symbol energy,” “are used to calculate the energy per bit to noise power ratio value (E_b/N_t) and the normalized re-encoded symbol energy value. (*Id. at* 9:54-58). As such, a POSITA would have understood these variables to have similar functions as the ’544 patent’s reporting identifiers, and are used in a two-dimension signal quality metric to “provide accurate DTX detection.” (*Id. at* 11:58-60).

B. Motivation to Combine

132. A POSITA would have been motivated to combine the teachings of Nylander and Kim to arrive at claim 1 of the ’544 patent for at least the following reasons.

133. **First**, it is my opinion that the ’544 patent and the asserted references are all analogous art because they are generally directed towards the same network communication technology field of art, and involve similar technological components and address similar issues. The prior art references and the ’544 patent are directed to wireless telecommunication networks, such as a third generation (3G) Long Term Evolution (LTE) network and W-CDMA. (*Compare* EX1001 at [38-41] *with* EX1007 at [0002], [0034], EX1008 at 6:21-25, *and* EX1009 at 1:19-29). Further, the references all disclose networks which comprise of similar components.

For instance, Nylander, Kim, Lin, and the '544 patent each teach the use of base stations that cover cells and wireless devices that measure signals transmitted from the at least one base station.

134. **Second**, a POSITA would have been motivated to combine the teachings of Nylander, Kim, and Lin to arrive at the '544 patent because the prior art references also address the same problems and propose similar solutions to what is taught by the '544 patent. Specifically, Nylander, Kim and the '544 patent are also all directed towards the idea of energy conservation in an LTE system. The '544 patent “relates to the field of activating inactive cells of telecommunication infrastructure for purposes such as controlling energy consumption.” (EX1001 at 1:20-24). Nylander teaches that its “basic idea is to let the base station enter a low-power, low-radiation cycle, the so-called sleep mode” and “to ‘wake up’ the base station from this state when there is a UE in the vicinity which is allowed to access the base station.” (EX1007 at Abstract). Nylander emphasizes that “[t]his reduces energy costs and environmental impacts due to energy production” and “enables efficient control of when a base station should enter a low-power mode and when it should resume regular operation.” (*Id.* at [0023]). Kim similarly discloses that it “efficiently report[s] measurement information” to “execut[e] a power-saving operation.” (EX1008 at 1:06-13). Kim’s “terminal executes a power-saving

operation based on DRX/ and/or DTX parameters in DRX/DTX operation. (*Id.* at 4:11-13). Further, a POSITA would recognize that using the same reporting measurement system in Nylander's network infrastructure would still bring similar power-saving benefits. Finally, Lin also discloses the use of DTX intermittent transmissions to prevent overallocation of resources and reduce interference levels, which a POSITA would understand to be related to the field of power management and control. (EX1009 at 1:49-52, 2:25-30).

135. **Third**, a POSITA would also have been motivated to combine the teachings of Nylander and Kim to obtain a measurement report according to certain measurement and/or reporting parameters, as Kim discloses, "for efficiently reporting measurement information on a serving cell and neighboring cells." (EX1008 at 6:5-7). In addition, a POSITA would have understood that measurements based on different parameters provides different types of information on which an activation decision could be based. A POSITA would have further understood the different types of information available in different systems and would have understood the advantages and disadvantages of each. Therefore, a POSITA reading Nylander would have understood how the techniques of Kim could be used to improve the consistency and accuracy of the measurement results which would better assist the network in deciding whether to activate a base station in sleep

mode. Thus, based on my review of the references, it is my opinion that a POSITA would have been motivated to incorporate the measurement reporting method of Kim into its operations to facilitate efficient reporting of detected reference signals and system information.

136. In addition, taking measurements according to Kim's disclosed measurement parameters would have improved upon the energy conservation goals of Nylander. A POSITA would have understood that Kim teaches a terminal in a power-saving operation which can only be instructed to report measurement information corresponding to a "DRX/DTX period according to a pre-established measurement information report parameter." (EX1008 at 10:21-24). Kim discloses that this is implemented to allow for the terminal to "efficiently report the measurement information . . . [o]therwise, the report of measurement information may collide with the power-saving operation." (*Id.* at 8:32-9:2). A POSITA would therefore have understood that taking measurements according to these parameters could help improve the energy conservation goals as expressed in Nylander and Kim.

137. Similarly, a POSITA would have also been motivated to incorporate a measurement and reporting process, as taught by Kim, into the telecommunications method of Nylander in order to allow for "efficient[] reporting measurement

information on a serving cell and neighboring cells which is required for an active-state terminal executing power-saving operation[s].” (EX1008 at 6:5-10). Kim’s teachings of measuring signal information from an inactive base station would also help improve Nylander’s objective of determining when to wake up a sleeping base station. (EX1007 at [0023], [0035]). While Nylander teaches a terminal that can wake up a sleeping base station (*e.g.*, HN) in its vicinity based on “fingerprint” information, as explained above, Nylander’s network could also use the information obtained from measuring the reference signals transmitted by the HN in Kim to help decide whether to wake up the HN. A POSITA would also understand that, by implementing the parameters for the measuring and reporting processes as taught by Kim, one could not only improve the consistency and accuracy of the measurements obtained but also facilitate efficient communication of relevant information between the terminals and base stations.

138. A POSITA would have also been motivated to combine Lin’s teaching of detecting the DTX transmission period (*i.e.*, probing period) of a base station in DTX mode using “reporting identifiers,” such as an energy per bit to noise power ratio and a re-encoded symbol energy. (EX1009 at 9:8-12). Lin teaches that “[i]n both the forward link and reverse link channels capable of DTX, the decision to transmit or not transmit a frame is determined at the transmitter,” and the receiver

has no prior knowledge of when DTX will occur.” (*Id.* at 4:32-35). Thus, in order to inform the terminal about when the DTX transmission occurs on the forward link, Lin also teaches that DTX detection occurs at the receiver (*Id.* at 4:35-41), which allows for the mobile station’s DRX measurements to synchronize with the base stations DTX transmissions while also enhancing the accuracy of requests for transmit power adjustment that the mobile station sends to the base station transmitter. (EX1009 at 3:9-27).

C. Reasonable Expectation of Success

139. In my opinion, a POSITA would have had a reasonable expectation of success when combining Nylander, Kim, and Lin to arrive at the patented claims because the modifications entail software implementations that was well within the knowledge and capability of a skilled artisan. As discussed above, a POSITA would have known that programming a known system to perform certain well understood functions would have yielded a predicable result at least given the similarity of the systems to which those techniques were being applied. As Nylander explains, “those skilled in the art will appreciate that the means and functions explain [in Nylander] may be implemented using software functioning in conjunction with a programmed microprocessor or general purpose computer, and/or using an application specific integrated circuit (ASIC).” (EX1007 at [0031]).

140. In addition, incorporating Kim’s teachings would involve an application of a known technique to solve similar problems with predictable results. As explicitly disclosed by Kim, its proposed solutions “may be programmed for a computer” and “may be easily inferred by a computer programmer of ordinary skill in the art to which the present invention pertains.” (EX1008 at 21:33-22:2).

141. Similarly, Lin also explains that “information and signals may be represented using any of a variety of different technologies and techniques,” including “data, instructions, commands, information, signals, bits, symbols, and chips.” (EX1009 at 12:1-5). Lin further explains that “[t]hose of skill in the art would further appreciate that various illustrative logical blocks, modules, circuits, and algorithm steps . . . may be implemented as electronic hardware, computer software, or combinations of both.” (*Id.* at 12:9-14).

142. In light of these teachings above, a POSITA would have reasonably expected to be able to successfully incorporate (i) the measurement reporting method of Kim into Nylander’s operations to facilitate efficient reporting of detected reference signals and system information and (ii) the reporting identifier of Lin into the Nylander-Kim system to facilitate DTX detection for purposes of intermittent measurement synchronization and accurate mobile station requests for base station transmit power adjustments.

D. Claim 1

- 1. 1[pre]: “A terminal configured for operating in a wireless access telecommunication infrastructure comprising an active base station and at least one inactive cell, wherein the terminal comprises:”**

143. In my opinion, Nylander discloses this limitation to the extent the preamble is limiting.

144. Nylander discloses a terminal (UE (108)) configured for operating in a mobile telecommunication network (Fig. 1b), which includes wireless access telecommunication infrastructure. (EX1007 at Fig. 1b, [0033], [0014], [0005] (“[t]hrough this setup[,] a mobile terminal, also known as user equipment (UE), communicates via the HN and the core network”). Nylander’s telecommunication infrastructure include components such as an active, macro base station (104) and at least one inactive, or “energy efficient,” base station (102), covering an inactive cell (see orange annotation below). (*Id.* at [0033], Fig. 1b, [0032] (“the term energy efficient base station will be abbreviated EEBS”)).

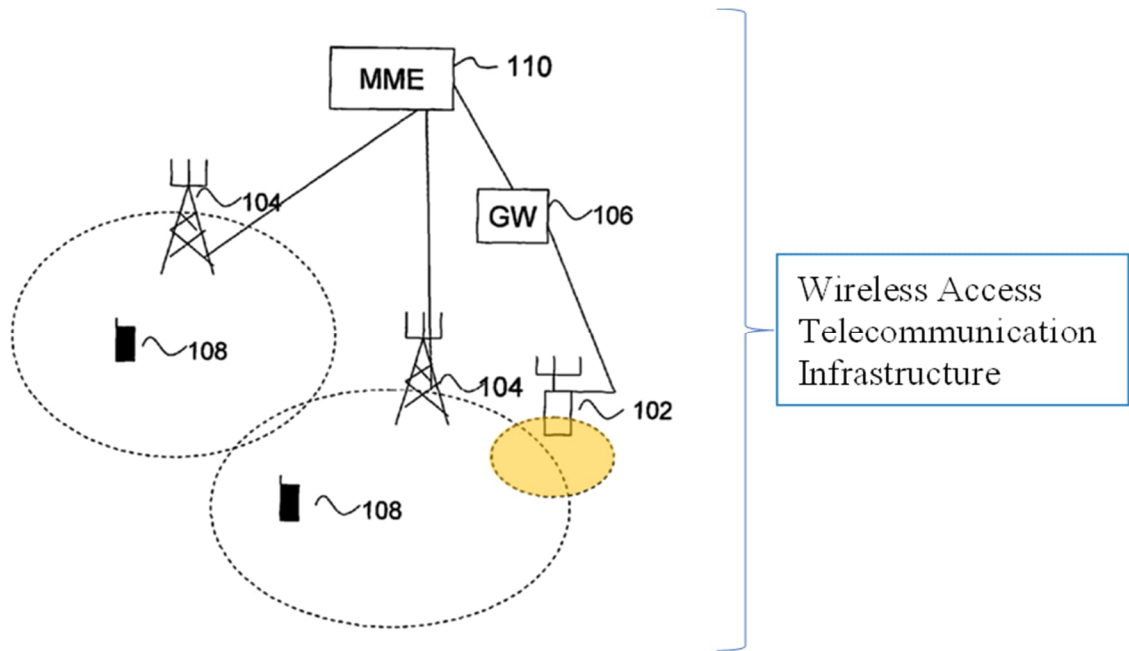


Fig. 1b (color annotation added).

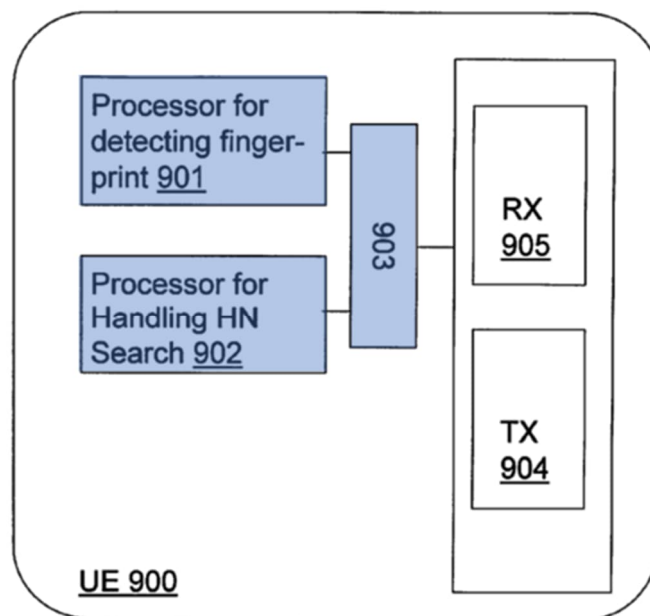
145. In Nylander, “a typical energy efficient base station [“EEBS”] is [also] a HN.” (*Id.* at [0032]). Nylander’s EEBS “is configured to enter sleep mode, wherein the EEBS transmits its reference signal and system information less frequently than during regular operation, and the UE is allowed to access the at least one EEBS.” (*Id.* at [0014]; [0033]). Nylander discloses that the EEBSs can be “turned off, say 90% of the time.” (*Id.* at [0042]).

2. 1[a]: “a processor for executing instructions that cause the terminal to carry out operations including:”

146. In my opinion, Nylander discloses this limitation.

147. Nylander teaches a terminal (108, 900) with processors (901, 902, 903) for executing instructions that cause the terminal (108, 900) to carry out operations

(e.g., detecting a fingerprint or determining the identity of a detected FIN). Specifically, Nylander discloses “a processor 902 for performing a search for HNs that the UE [terminal] is allowed to access,” “a processor 901 for detecting a fingerprint based on transmissions from macro base stations,” and “a processor 903 for determining the identity of the detected FIN in sleep mode.” (EX1007 at [0097]; [0003] (explaining that “the abbreviation HN is used to denote either 3G Home Node B or an EPS/LTE Home eNodeB”)).



(EX1007, Fig. 9, color annotated).

3. **1[b]: “receiving in a transmission from the active base station measurement parameters and/or reporting parameters, wherein the received measurement parameters and/or reporting parameters trigger the terminal to obtain information regarding a presence signal from the at least one inactive base station”**

148. Because this limitation includes two separate requirements, I address them separately below. Nonetheless, it is my opinion that Nylander in view of Kim renders obvious all aspects of this limitation.

- ***receiving in a transmission from the active base station measurement parameters and/or reporting parameters***

149. Kim teaches that its terminal receives a DRX/DTX parameter and a measurement information report parameter at step S406. (EX1008 at 17:2-4 (“In step S406, the base station informs the terminal of the decided DRX/DTX parameter and the measurement information report parameter.”). Specifically, Kim discloses that “[t]he measurement information report parameter may include a measurement information period, a measurement information report period, a measurement information report object, and a measurement information report content.” (*Id.* at 10:33-11:1; 17:2-4; Fig. 4). This “measurement information report parameter may further include information defining measurement information report requirements for a case when an event occurs, which will be called an event-driven measurement information report requirements.” (*Id.* at 11:1-6). “In short, the measurement information report parameter can be set up by selecting any one among the types of

measurement information report messages shown in Table 1 in the base station, and informing the terminal of an index corresponding to the selected measurement information report message type.” (*Id.* at 17:9-14).

- ***wherein the received measurement parameters and/or reporting parameters trigger the terminal to obtain information regarding a presence signal from the at least one active base station***

150. Nylander teaches that when its UE detects a fingerprint, it “triggers a UE in idle mode to perform an extensive search [] for the HN associated with the detected fingerprint, by pro-longing the search or using more frequent search periods than during regular operation.” (EX1007 at [0048]). For instance, “[t]he purpose of extending the search is to facilitate discovery of an HN that is in sleep mode [(i.e., EEBS)].” (*Id.* at [0048]). “[D]uring the sleep mode . . . the EEBS transmits its reference signal and system information less frequently than during regular operation.” (*Id.* at [0040]). Based on this disclosure, a POSITA would have understood that the “extensive search [] for the HN” includes measuring the reference signals from an HN in sleep mode (*i.e.*, EEBS). A POSITA would have further understood that the “reference signals” as taught by Nylander are functionally equivalent to the “presence signal” defined in the ’544 patent.

151. Kim further teaches that once its terminal obtains the DTX/DRX parameters and a measurement information report parameter (*i.e.*, receiving the

measurement parameters and/or reporting parameters), the parameters trigger the terminal to begin analyzing information regarding a presence signal from at least one inactive base station. (EX1008 at 17:15-19 (“the terminal measures information on the serving cell and neighbor cells at every measurement information report period while executing the DRX/DTX operation based on the parameter set up by the base station”); *and* 8:32-35 (terminal “should report measurement information at a period related to the DRX and DTX periods to efficiently report the measurement information.”)).

152. In addition, Kim teaches that the measurement information that the terminal obtains regarding the signal may be “radio channel quality,” “time taken for the measurement,” and “the interference level from the neighbor cells” (*Id.* at 11:21-30). A POSITA would have understood this measurement information to be “presence signals,” as these types of signals are consistent with the types of presence signals explicitly defined in the ’544 Patent. (EX1001, 4:44-64 (disclosing that a “presence signal” may include “system information” such as “cell identity, power level of its beacon signal, etc.”));

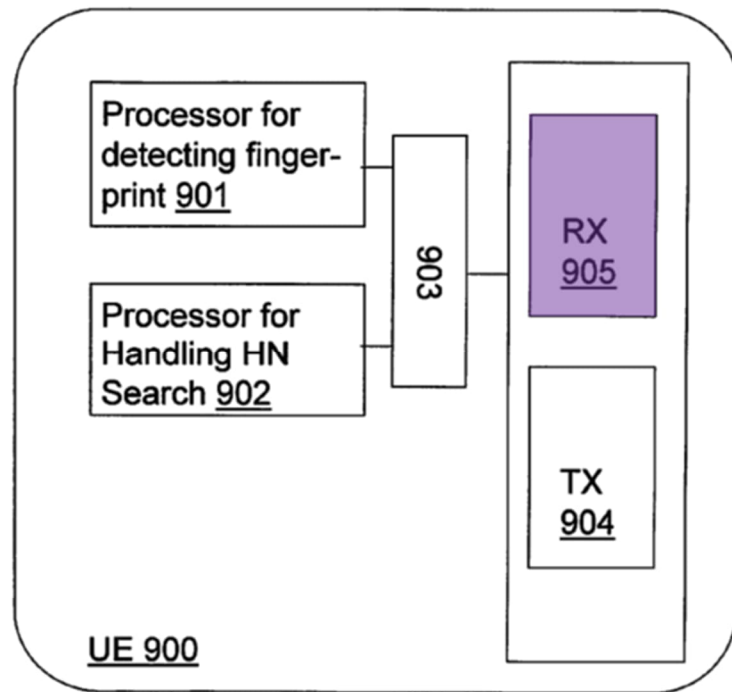
153. As discussed above in Sections X.B-C, a POSITA would have been motivated to combine, with a reasonable expectation of success, the teachings of Nylander and Kim to incorporate Kim’s measurement and reporting parameter into

Nylander's telecommunications method and to require Nylander's measuring to take measurements according to, or consistent with Kim's disclosed measurement and/or reporting parameters.

4. 1[c]: “receiving the presence signal transmitted from the at least one inactive base station;”

154. In my opinion, Nylander alone or in view of Kim discloses this limitation.

155. Nylander teaches that its terminal (108) *receives a presence signal* (i.e., reference signal) *transmitted from the at least one inactive base station* (102). (EX1007 at [0097] (discloses a terminal comprising “a receiver 905 for receiving transmissions from base stations”)). Further, Nylander discloses that “[t]he at least one EEBS [(“energy efficient base station”)] is configured to enter a sleep mode (i.e., become an inactive base station), which causes the EEBS to transmit its reference signal and system information “less frequently than during regular operation, and the UE is allowed to access the at least one EEBS.” (EX1007 at [0021]). In Nylander's UE, the receiver 905 is responsible for receiving transmissions from the base stations. (*Id.* at [0097]).



(EX1007 at Fig. 9).

156. And as discussed above with regard to limitation 1[b], Kim also teaches a terminal obtaining signals relating to “radio channel quality,” “time taken for the measurement,” and “the interference level from the neighbor cells” (*id.* at 11:21-30). A POSITA would have understood this measurement information to be similar to the types of “presence signals,” disclosed in the ’544 Patent

5. **1[d]: “obtaining a measurement report regarding the presence signal transmitted from the inactive base station and;”**

157. In my opinion, Nylander in view of Kim discloses this limitation.

158. Kim teaches that its terminal obtains a measurement report regarding transmissions (*e.g.*, signals) that it receives from a base station. (EX1008 at 6:30-34

(“measuring channel quality according to a measurement information report period included in the measurement information report parameter, and reporting measurement information formed based on the measurement information report parameter”); 18:1-5 (disclosing that “the terminal executes an event-driven measurement information report when a predetermined condition is satisfied while the terminal executes [a] measurement information report periodically based on the measurement information report parameter”); *and* 20:33-21:1 (discloses that “the terminal executing a power-saving operation wakes up at the measurement information report period included in the measurement information report parameter, measures channel qualities of the serving cell and neighbor cells, . . .”).

159. Kim further teaches, as already discussed above, that the measurement information that the terminal obtains regarding the signal may be “radio channel quality,” “time taken for the measurement,” and “the interference level from the neighbor cells.” (*Id. at* 11:21-30). A POSITA would have understood this measurement information to be the same type of “presence signals,” as defined by the ’544 Patent. (EX1001, 4:44-64 (disclosing that a “presence signal” may include “system information” such as “cell identity, power level of its beacon signal, etc.”)).

160. Further, Kim discloses that “the measurement should be carried out while the terminal maintains the DRX/DTX periods for power-saving operation,”

and “[t]he monitoring duration for monitoring downlink control information from the base station follows the predetermined DRX/DTX periods.” (*Id.* at 9:24-33). As part of this process, Kim discloses that “the base station can direct the terminal to report measurement information along with the transmission of packet data.” (*Id.* at 10:25-27, 20:27-33).

161. As discussed above in Sections X.B-C, a POSITA would have been motivated to combine, with a reasonable expectation of success, the teachings of Nylander and Kim so that Nylander’s terminal (108) can obtain a measurement report, as taught by Kim, based on its measurements of the reference signals (*i.e.*, “presence signals”) transmitted from Nylander’s sleeping base station (102).

6. 1[e]: “providing the measurement report to the telecommunications infrastructure via the active base station,”

162. In my opinion, Nylander in view of Kim discloses this limitation.

163. Nylander’s network includes an active base station (104), and it would have been obvious from a POSITA’s perspective for the active station to provide a measurement report to the telecommunications infrastructure because Kim expressly teaches that its terminal provides the measurement report to the telecommunications infrastructure via the active base station. (EX1008 at 20:27-33 (“terminal . . . reports the measurement information to the serving base station [(*i.e.*, active base station)]

by using radio resources allocated by the serving base station”); *see supra* Section X.D.5). The measurements would include “channel qualities of the serving cells and neighbor cells.” (EX1008 at 21:01-02).

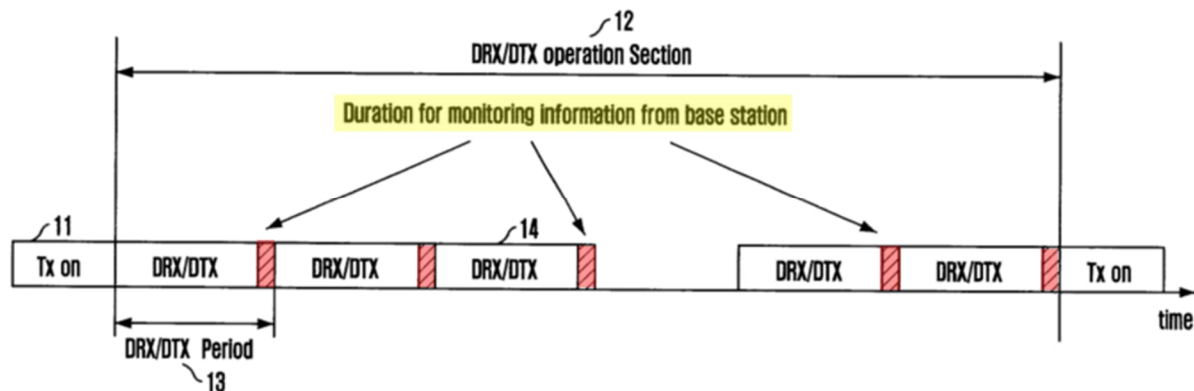
164. As discussed above in Sections IX.B-C, a POSITA would have been motivated to combine, with a reasonable expectation of success, the teachings of Nylander and Kim such that Nylander’s terminal (108) would provide a measurement report including a wake-up indication it sends to the mobile telecommunication network via Kim’s macro base station (104).

7. **1[f]: “wherein the operations further include: receiving a reporting identifier transmitted from the inactive base station, the received reporting identifier indicating that the inactive base station is in a probing period;”**

165. In my opinion, Nylander in view of Kim and Lin discloses this limitation.

166. As explained above for limitation 1[c], Nylander teaches a terminal (108) which receives a reference signal (which a POSITA would recognize to be a “presence signal”) transmitted from the at least one inactive base station (102). Specifically, Nylander discloses that its “at least one EEBS [(“energy efficient base station”)] is configured to enter a sleep mode [(*i.e.*, inactive base station)], in which the EEBS transmits its reference signal and system information [(*i.e.*, presence signals)] less frequently than during regular operation.” (EX1008 at [0021]).

167. Based on this disclosure, a POSITA would have understood that Nylander's EEBS operates in DTX mode, as illustrated by FIG 1 of Kim below, and transmits its reference signals and system information during a portion (annotated in red) of the DRX/DTX Period 13:



(EX1008 at FIG. 1). A POSITA would have also known that one of the major advantages of operating in DRX/DTX mode is power savings at the base stations and terminals, which aligns with Nylander's and Kim's explicit objective of controlling energy use in its systems. (EX1008 at 4:11-20).

168. A POSITA would have also recognized, based on Lin's disclosure, that because "[i]n both the forward and reverse link channels capable of DTX, the decision to transmit or not transmit a frame is determined at the transmitter," so "[t]he receiver has no prior knowledge of when DTX will occur." (EX1009 at 4:32-36). Thus, Lin raises a new issue: "[t]he receiver [(i.e., mobile station)] is then faced with the problem of determining when a signal was transmitted [(i.e., probing

period)] or when there is a lack of a signals.” (*Id.* at 2:1-3). As a possible solution, Lin teaches that “the MS 130a incorporates DTX detection in order to accurately determine when the BS 110a is transmitting data [(i.e., probing period)] and when the BS 110a is not transmitting data to it.” (*Id.* at 5:33-38).

169. Thus, Lin proposes that its “DTX detector 250 uses signal characteristics of the received signal to help make the DTX determination” and “calculates a multi-dimensional quality metric and uses the metric in the DTX determination.” (*Id.* at 7:32-36). “A receiver in the MS 130a receives, demodulates, and decodes the signal in order to recover the data.” (*Id.* at 5:33-35). “The DTX detection algorithm uses multiple variables [(i.e., reporting identifier)] generated from the received signal in order to generate a multi-dimensional signal metric.” (*Id.* at 5:38-41). “[A] first dimension, X, is an energy per bit to noise power ratio and a second dimension, Y, is a normalized re-encoded symbol energy” (*i.e.*, reporting identifiers). (*Id.* at 9:1-12).

170. Based on Lin’s disclosure that its “DTX detection may be implemented directly in the MS when the DTX transmission occurs on the forward link,” a POSITA would have understood that Lin’s data variables (*e.g.*, X, Y) two-dimensional signal quality metric can function like a “reporting identifier” as defined

by the '544 patent by indicating whether the inactive base station was transmitting data (*i.e.*, in a probing period).

8. 1[g]: “recognizing the reporting identifier; and”

171. In my opinion, Nylander in view of Kim and Lin renders this limitation obvious.

172. Lin discloses “[a] receiver in the MS 130a receives, demodulates, and decodes the signal in order to recover the data. (EX1009 at 5:33-35). After decoding the signal, “the DTX detection algorithm uses multiple variables [(*i.e.*, reporting identifier)] generated from the received signal in order to generate a multi-dimensional signal metric.” (*Id.* at 5:38-41). “[A] first dimension, X, is an energy per bit to noise power ratio and a second dimension, Y, is a normalized re-encoded symbol energy” (*i.e.*, reporting identifiers). (*Id.* at 9:1-12). Based on this disclosure from Lin, a POSITA would have known that in order to recover the data and generate multiple variables from the received signal, the terminal MS 130a must be able to “recognize” the variables disclosed in Lin (which, as discussed above, function as the “reporting identifiers” as defined by the '544 patent).

9. **1[h]: “including the reporting identifier in the measurement report, the included reporting identifier being an indication to the telecommunications infrastructure that the measurement report was not obtained as part of a handover to the inactive base station.”**

173. Because this limitation includes two separate requirements, I address them separately below. Nonetheless, it is my opinion that Nylander in view of Kim and Lin discloses this limitation.

174. As discussed above, Nylander and Kim both disclose the use of sleep cycles or DRX/DTX periods to conserve power in their network systems. For instance, Nylander teaches a terminal (108) that detects a “reference signal and system information” transmitted from a base station (102) in sleep mode. (EX1007 at [0014] (“EEBS transmits its reference signal and system information less frequently than during regular operation, and the UE is allowed to access the at least one EEBS”)). Similarly, Kim discloses that a “terminal executing the power-saving operation should report measurement information at a period related to the DRX and DTX period to efficiently report the measurement information.” (EX1008 at 8:32-35).

- ***“including the reporting identifier in the measurement report”***

175. A POSITA would have understood Lin to teach systems based on code division multiple access (CDMA), which may be designed to support 3rd Generation

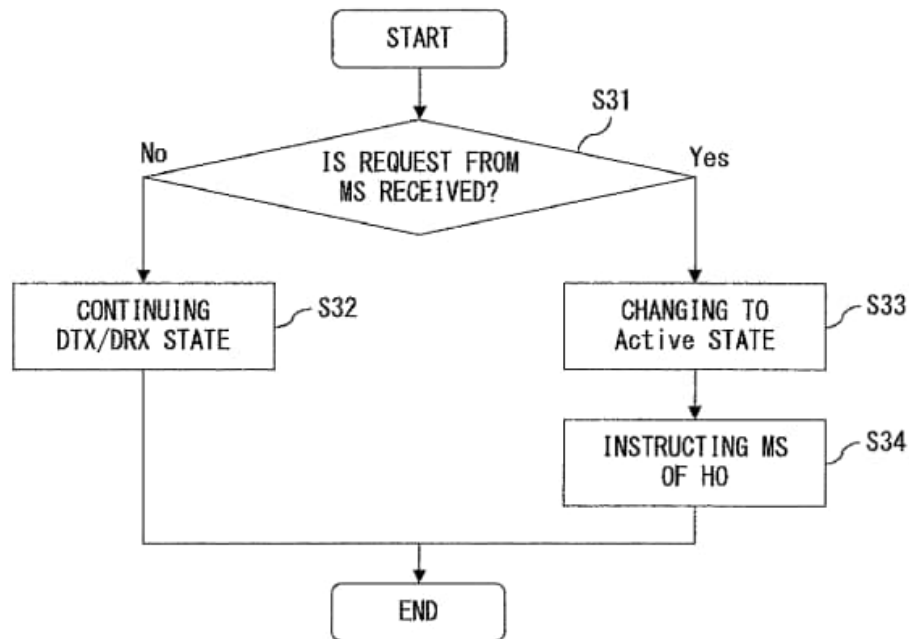
Partnership Project (3GPP). (EX1009, 1:12-29). Based on Lin's disclosure, "[a] typical CDMA communication system uses closed loop power control" where "a transmission is made, a measurement is made at the receiver, and feedback is provided to the transmitter." (*Id.* at 2:31-38). Further, Lin discloses that "[i]n closed loop power control, the receiver . . . calculates a metric that is based on the quality of the received signal." (*Id.* at 2:39-41). "A typical metric used in the receiver is the received energy per bit to noise power ratio (E_b/N_t)." (*Id.* at 2:41-49). "Then, the receiver communicates a power control signal back to the transmitter that is based in part on the received signal metric." (*Id.* at 2:49-51 (emphasis added)). As explained above with respect to limitation 1[f], a POSITA would have recognized the "energy per bit to noise power ratio" as a "reporting identifier" as defined by the '544 patent as it could be used to determine whether a DTX transmission from a base station in DTX mode is taking place.

176. Based on the disclosures above, a POSITA would have been motivated to include the report identifier in the measurement report of the Nylander-Kim system with a reasonable expectation of success. Specifically, a POSITA would have understood a measurement report to be an efficient way to share measurement information with other network components, and the system benefits from knowing

information about DTX/DRX employed during the measurement to properly record and interpret measurement results.

- ***The included reporting identifier being an indication to the telecommunications infrastructure that the measurement report was not obtained as part of a handover to the inactive base station***

177. Regarding its variables, Lin teaches that: “a first dimension, X, [which] is an energy per bit to noise power ratio and a second dimension, Y, [which] is a normalized re-encoded symbol energy” are used to indicate the occurrence of a DTX transmission from the base station. (EX1009 at 9:1-12) Based on this disclosure, POSITA would have understood two things: first, that such variables correspond to the “reporting identifier” as defined by the ’544 patent, and second, that the measurement was not obtained as part of a handover to the inactive base station. Based on other art available to a POSITA at the time, a POSITA would have known that handover cannot occur during intermittent communication (*e.g.*, DTX). (*See e.g.*, EX1010 at 1:46-56). For instance, Tajima teaches that “if it becomes necessary to switch a base station at a connection destination by performing a handover due to a move of the mobile station during the intermittent communication, the mobile station initially needs to change the communication state from the intermittent communication state to an active state before executing the handover process.” (*Id.*).



(EX1010 at FIG. 16). As shown by FIG. 16 (reproduced above) of Tajima, a POSITA would have known that “[i]f it is determined in step S31 that the handover request is received from the mobile station 2, the process goes to step S33. After changing to the active state in step S33, the handover instruction is transmitted to the mobile station 2 in step S34.” (EX1010 at 12:30-34). If a handover request is not received, the mobile station 2 and base station continue in DTX/DRX mode. (See *id.* at 12:26-29, 9:22-31). Based on this disclosure, a POSITA would have known that the decision to “continue in DTX/DRX mode” is separate from the handover request, as the mobile station only continues to remain in the idle state if the handover request *is not received*.

XI. SECONDARY CONSIDERATIONS OF NON-OBVIOUSNESS

178. I am not aware of any secondary considerations, or so-called “objective indicia of non-obviousness” for the challenged claims.

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

180. Patent Owner has not identified any such secondary considerations, and I am not independently aware of any. For example, as discussed throughout, the claimed features reflect predictable results of combining known elements according to their known functions, and thus, there are no unexpected and superior results from the claimed invention.

181. Further, even if Patent Owner were to assert that secondary

considerations exist, given the strong reasons that the challenged claims are obvious in light, including the motivations to combine the references set forth above, I do not believe any such secondary considerations would rise to the level of overcoming the invalidity opinions I have expressed.

182. I understand that Patent Owner may address the issue of secondary considerations more fully in the future. I reserve the right to respond to any specific bases for such secondary considerations that Patent Owner may identify.

XII. CONCLUSION

183. For the reasons set forth above, I believe claim 1 of the '544 patent is unpatentable in view of the prior art. In signing this declaration, I understand that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I acknowledge that I may be subject to cross-examination in this case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

184. I declare that all statements made herein of my knowledge are true, that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like

Expert Declaration of Kevin C. Almeroth, Ph.D.

Inter Partes Review

U.S. Patent No. 9,462,544

so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Dated: January 25, 2025

By: 
Kevin C. Almeroth, Ph.D.