

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

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 9,462,544**

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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

LIST OF CHALLENGED CLAIMS

Claim 1	Limitations
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:
1[a]	a processor for executing instructions that cause the terminal to carry out operations including:
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;
1[c]	receiving the presence signal transmitted from the at least one inactive base station;
1[d]	obtaining a measurement report regarding the presence signal transmitted from the inactive base station and;
1[e]	providing the measurement report to the telecommunications infrastructure via the active base station,
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;
1[g]	recognizing the reporting identifier; and
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.

I. INTRODUCTION

Samsung Electronics, Co., Ltd. and Samsung Electronics America, Inc. (“Petitioners”) respectfully request IPR of claim 1 of U.S. Patent No. 9,462,544 (the ’544 patent). A reasonable likelihood exists that Petitioners will prevail on this claim.

The ’544 patent “relates to the field of telecommunications infrastructures.” (EX1001, 1:19-20). Specifically, the patent concerns “controlling energy consumption and electromagnetic radiation” from a telecommunications network. (EX1001, 1:20-24). According to the patent, operating wireless networks for telecommunication is “highly energy consuming,” (*Id.*, 1:28-29), and “energy is considered as a significant part of the operation expenses of a cellular network,” (*Id.*, 1:43-44). The patent also states that “for health reasons, it is advisable to limit the amount and duration of electromagnetic radiation to a level that is strictly necessary for the operation of a base station.” (*Id.*, 4:2-5).

The ’544 patent does not purport to invent any new methods or mechanisms for controlling energy consumption and electromagnetic radiation. Rather, the ’544 patent merely purports to improve existing solutions by reducing energy consumption and electromagnetic radiation by intermittently deactivating base stations at opportune times and reactivating them when necessary, and increasing their accuracy by determining more accurately which base stations and/or cells

should be activated.” (See EX1001, 2:1-3, 2:7-24). To determine “when and/or which base stations or cells need to be activated,” the patent describes using a terminal (e.g., mobile phone) to measure and report information from a cell covered by an inactive base station. (*Id.*, 1:54-58, 2:7-24).

The ’544 patent concedes that this methodology is old and well known. It notes that “[v]arious studies have been performed to reduce conventional energy consumption in wireless access networks,” (EX1001, 1:33-37), and that “[i]t is recognized that the main saving potential resides in using variations in load over time, that allows to switch off parts of the resources, for example during the night,” (*Id.*, 1:44-47). The patent also acknowledges that “[c]apabilities of terminals to gather information about a cell (e.g., measure a signal transmitted by a cell) and to report such information are **known in the art.**” (EX1001, 2:25-27 (emphasis added)). Moreover, “[i]n existing wireless access telecommunications networks, terminals **usually already perform** measurements in certain conditions and may report measurement results in certain other conditions.” (*Id.*, 7:16-19 (emphasis added)). And “the disclosed method and telecommunications infrastructure use **existing measurement and reporting capabilities** of wireless terminals.” (*Id.*, 22:62-64 (emphasis added)).

The Background Section of the ’544 patent further demonstrates that the patent discloses nothing new. It explains that “[o]nce base stations (or one or more

cells thereof) have been deactivated, at some point in time these base stations (or cells) may have to be reactivated again.” (*Id.*, 1:54-56). “Thus, a decision is **required** when and/or which base stations or cells need to be activated.” (*Id.*, 1:56-58 (emphasis added)). A first prior art solution discussed in the ’544 patent involves “activat[ing] the base stations or cells at a predetermined time,” (e.g., during the day when demand is high). (*Id.*, 1:59-63). A second involves “activat[ing] all inactive cells adjacent to (i.e., relevant for) a currently active cell when the currently active cell detects a certain traffic load exceeding a threshold or detects a rising traffic load.” (*Id.*, 1:64-67).

The ’544 patent aims to improve these old solutions by allegedly determining “more accurately which base stations and/or cells should be activated.” (EX1001 at 2:1-3 (emphasis added)). The patent purports to accomplish this goal by analyzing the signal measurements that terminals make on inactive base stations, and activating the inactive base station “when the processing result fulfils at least one activation condition.” (*Id.*, 2:21-24; 5:33-50). However, as detailed below, this approach was well known and widely documented in the prior art. For example, the two combinations discussed in this petition—(i) Frenger (EX1004) in view of Fischer (EX1005) and Hurst (EX1006), and (ii) Nylander (EX1007) in view of Kim (EX1008) and Lin (EX1009)—each discloses the claimed limitations, including a wireless telecommunication network wherein terminals perform measurements on

inactive base stations and report the measurements to the network to inform a decision whether to activate an inactive base station.

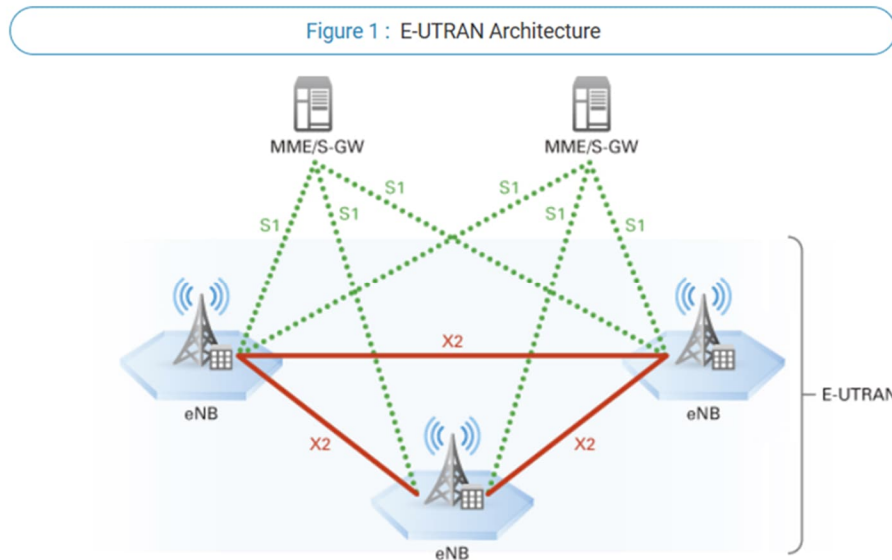
II. STANDING

Petitioners certify that the '544 patent is available for IPR and that Petitioners are not estopped from requesting IPR under 35 U.S.C. § 315(e)(1).

III. TECHNICAL BACKGROUND

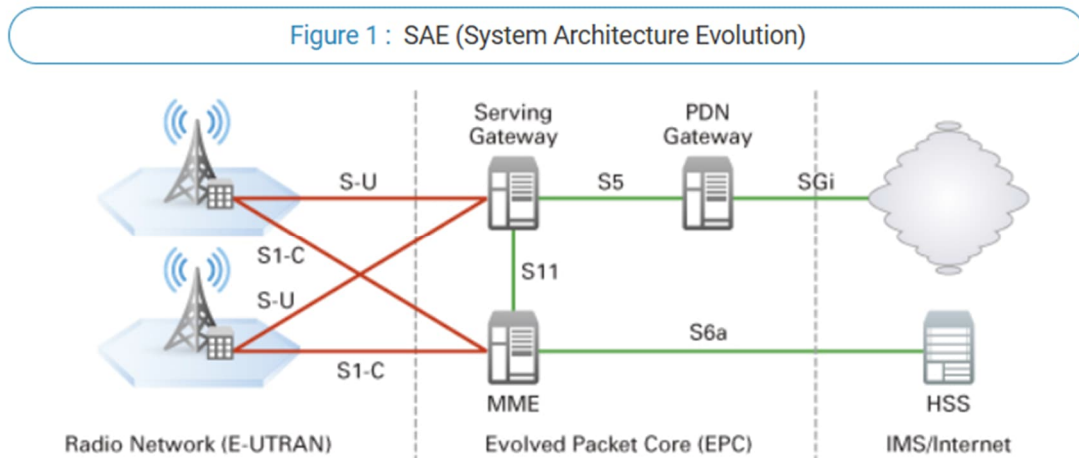
The '544 patent relates to 3GPP LTE (or 3rd Generation Partnership Project Long Term Evolution), which is a wireless broadband communication standard that enhances mobile data rates and capacity. (EX1003, ¶¶33-35). LTE technology was first introduced in 2008 and, among other things, simplified network architecture by consolidating the logic for how a mobile device connects to the cellular network. (*Id.*).

A standard LTE system architecture consists of an Evolved UMTS Terrestrial Radio Access Network (more commonly known as E-UTRAN) and the System Architecture Evolution (also known as SAE). The E-UTRAN functions as a radio access network and consists of the “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). (EX1003, ¶36).



The eNBs allow UEs (i.e., any consumer device that can be used for communication, including 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. (EX1003, ¶37). Each eNB covers a specific geographic area called a “cell” and communicates both with the UEs inside the cell and with other eNBs to create a network of overlapping cells that provide seamless coverage across a region. (*Id.*). The E-UTRAN enables eNBs to communicate with and manage other eNBs and UEs, as well as ensures seamless wireless connectivity and efficient data transmission between UEs and the core network. (*Id.*). Functions supported by E-UTRAN include cell search, handover, power control, and link adaptation. (*Id.*).

The SAE builds on the E-UTRAN to provide functionality related to the core network architecture. 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. (*Id.*, ¶38). At a high level, the SAE acts as the “brains” of the system, responsible for managing user data flow, mobility, and overall network connectivity. (*Id.*).



One of the primary drawbacks of LTE technology is its relatively high power consumption compared to older cellular technologies like 2G and 3G. (*Id.*, ¶39)). This characteristic of LTE is due to the increased data transmission speeds and complex network processing schemes required for high-bandwidth data transfer. (*Id.*). Various solutions have been developed to reduce LTE network power consumption. (*Id.*). For example, network components may be switched on/off or placed in sleep mode to dynamically allocate resources in response to consumer

demand, and devices that are not actively transmitting or receiving data may be disabled. (*Id.*).

One implementation of this technique described in the prior art cited in this petition uses 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 wake-up to transmit necessary data. (*Id.*, ¶40). DRX technology allows the UEs to periodically “wake up” from low-power mode to receive data transmissions from the base station. (*Id.*).

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 permanently “wake up” until further instruction. (*Id.*, ¶41). Alternatively, if no instructions are received, the base station may return to sleep mode until the next “wake up” interval. By using DTX / DRX technology, a base station can reduce its energy consumption and electromagnetic radiation emissions. (*Id.*).

IV. OVERVIEW OF THE '544 PATENT

A. Priority

The '544 patent claims priority to several foreign applications, the earliest of which was filed on May 6, 2010. (EX1001). The prior art references relied upon in this petition predate May 6, 2010.

B. Disclosure

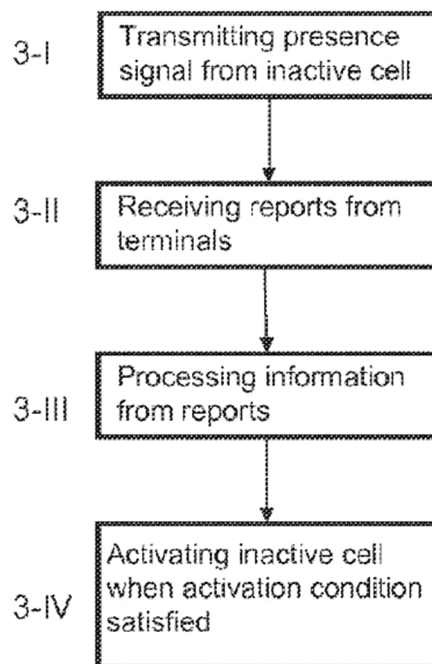
The '544 patent relates to methods of improving energy conservation and reducing the electromagnetic radiation of a telecommunications network by allowing the network to selectively deactivate and reactivate base stations or cells of the network. (EX1001, 1:19-24; EX1003, ¶42). This type of network operation in which select components or cells are turned on and off is commonly known as “dynamic base switching.” (EX1003, ¶42). Unlike traditional static networks, dynamic base 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. (*Id.*). The network can conserve energy by only activating necessary base stations in response to fluctuating demand for the cellular network. (EX1001, 6:37-41, EX1003, ¶42).

As recognized by the '544 patent, dynamic base switching was well known in the prior art before the '544 patent was filed. (EX1001, 1:54-67; EX1003, ¶43). For instance, the '544 patent describes two methods of implementing dynamic base

switching that it acknowledges as prior art. (*Id.*). The first method is to activate inactive base stations at a certain predetermined time, 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.*, 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. (EX1003, ¶43). The second 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. (EX1001, 1:64-67). This process allows a network to respond to demand requirements in real-time. (EX1003, ¶43).

The '544 patent purports to improve on these methods by “determining more accurately which base stations and/or cells should be activated.” (EX1001, 2:1-3; EX1003, ¶44). 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.*, 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 provided by discontinuous reception (DRX).” (*Id.*, 22:52-61). Subsequently, the active cells of the network report the

measurements performed by those terminals to the network. (*Id.*, 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.*, 8:13-23). Figure 3 of the ’544 patent depicts the disclosed method:



(EX1001, Fig. 3).

C. Prosecution History

The application that became the ’544 patent was filed on November 10, 2015, and claimed priority back to a foreign EP application (EP10162192) dated May 6,

2010. (EX1001, (30)). Original claim 16 in the application (which issued as claim 1) did not contain the limitations related to a “reporting identifier.” (EX1002, Original Claims (Nov. 10, 2015); EX1003, ¶¶45-46). The examiner issued a single non-final rejection of the original claim as anticipated by Frenger, finding that Frenger disclosed the network structure as originally claimed (*i.e.*, a wireless access telecommunication infrastructure comprising an active cell and at least one inactive cell). (EX1002, CTNF (Jan. 20, 2016); EX1003, ¶47). The examiner also found that Frenger disclosed the claimed steps of (1) receiving in the active base station ‘measurement parameters and/or reporting parameters to obtain information regarding a presence signal” from the inactive base station; (2) receiving measurement and reporting parameters to obtain information regarding the presence signal from the inactive base station(s); and (3) measuring and providing a measurement report to the network via the active base station. (*Id.*, pp. 3-4).

In response, the applicant amended the claim to add the “reporting identifier” limitations (*i.e.*, claim limitations 1[f]-1[h]). (EX1002, Amended Claims (June 17, 2016); EX1003, ¶48). The examiner subsequently allowed the ’544 patent, concluding that the prior art of record did not disclose the limitations [*i.e.*, limitations 1[f]-1[h]] directed to the “reporting identifier.” (EX1002, Notice of Allowance (June 27, 2016), p. 2).

V. GROUND

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

VI. LEVEL OF ORDINARY SKILL IN THE ART

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. (EX1003, ¶¶50-54). More education can supplement practical experience and vice versa. (*Id.*). Petitioners’ expert exceeded this skill level by the priority date. (*Id.*, ¶¶53-54).

VII. CLAIM CONSTRUCTION

For the purposes of this this proceeding, Petitioners contend no claim terms need construction because the claims read on the prior art presented below under any construction consistent with *Phillips* and should thus be given their plain and ordinary meaning. (EX1003, ¶¶55-56).

**VIII. GROUND 1: CLAIM 1 IS OBVIOUS OVER FRENGER IN VIEW OF FISCHER
AND FURTHER IN VIEW OF HURST¹**

Frenger (EX1004) discloses an LTE network infrastructure which comprises a terminal, at least one active base station, and at least one inactive base station. (EX1003, ¶57). Frenger's terminal receives presence signals from the inactive base station and conducts measurements on them. Then, the terminal reports those measurements back to the network. (*Id.*). Fischer (EX1005) provides additional context regarding the measurement and reporting processes, including providing parameters for each. (EX1003, ¶58). Specifically, before taking the measurements and generating the report, Fischer's terminal receives specific parameters instructing it how and when to measure presence signals and compile the measurements into a measurement report. Hurst (EX1006) discloses the inclusion of a reporting identifier, such as a DTX flag, in the measurement report. (EX1003, ¶59). Hurst further discloses that these reporting identifiers can be used for a variety of purposes, including RF Quality of Service (QoS) monitoring, network optimization, handover decisions, and geographic location determinations.

¹ Petitioners are not aware of any secondary considerations of nonobviousness identified by Patent Owner. (EX1003, ¶¶178-182).

As detailed below, a POSITA would have been motivated to combine the teachings of Frenger, Fischer, and Hurst to arrive at claim 1 of the '544 patent. (EX1003, ¶60).

A. Overview of Prior Art

1. Frenger (EX1004)

The PCT application that published as Frenger was filed on February 13, 2009, and published on April 19, 2012. Frenger thus qualifies as prior art under at least 35 U.S.C. § 102(e). (EX1003, ¶62).

Like the '544 patent, Frenger “relates generally to controlling energy of a wireless network node, such as a base station.” (EX1004, [0001]). Frenger primarily focuses on LTE systems and base stations, though “the same principles may also be used in other systems, such as WCDMA or GSM systems.” (*Id.*, [0022], [0023] (“the present invention will primarily be described with reference to base stations, especially LTE base stations”)). (EX1003, ¶63).

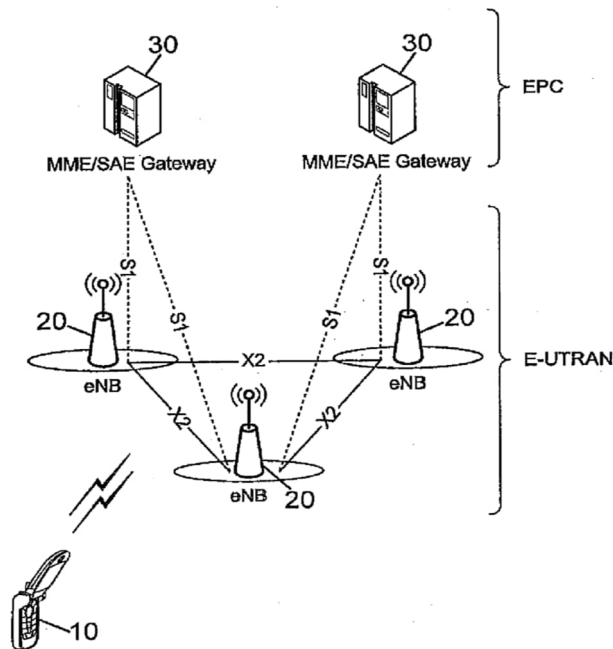
The basic idea of Frenger is “to restrict transmission downlink in the cell during time periods when there are no active terminals served by the cell,” (*id.*, Abstract), and to “wake up” the base station when a terminal enters the idle cell, (*id.*, [0034]). (EX1003, ¶64). Frenger discloses that the terminal finds the idle cell by detecting certain necessary signals (i.e., presence signals) for mobility and cell search that the idle base station intermittently transmits according to a Discontinuous

Transmission (DTX) cycle. (*Id.*, [0034]-[0035]). Frenger specifies various presence signals, including “reference (pilot) signals, synchronization signals, and broadcasted system information.” (EX1004, [0052]). As noted above, *see supra* § IV.B, 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 provided by discontinuous reception (DRX),” as Frenger does. (*Id.*, 22:52-61).

2. Fischer (EX1005)

Fisher was filed on January 7, 2009 and published on October 1, 2009. Accordingly, Fischer is prior art under at least 35 U.S.C. § 102(b). (EX1003, ¶65).

In largely the same manner as the ’544 patent, Fischer discloses “the configuration of measurements and their reporting from wireless devices in a cellular communications network.” (EX1005, [0003]; EX1003, ¶66). According to Fischer, the invention is disclosed “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 illustrates the “network structure of an evolved universal mobile telecommunication system (E-UMTS) . . . , [which] may be also referred to as an LTE system.”



Fischer teaches using terminals (e.g., mobile phones) to (i) perform measurements on presence signals received from a base station, (EX1005, [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 (ii) generate and transmit measurement reports based on measurement configuration data, (*id.*, [0045]). (EX1003, ¶67). Fischer further teaches that “[t]he measurement configuration data for a given UE includes measurement identity (ID) elements, measurement object elements and reporting configuration elements.” (*Id.*, [0025]).

3. Hurst (EX1006)

Hurst was filed on September 21, 2005 and published on Jun. 1, 2006. Thus, Hurst is prior art under at least 35 U.S.C. § 102(b). (EX1003, ¶68).

Hurst concerns synchronizing signal measurement reports in a mobile telecommunications network. (EX1006, [0001]; EX1003, ¶69). Hurst's network contains several cells that utilize Discontinuous Transmission ("DTX") cycles to conserve power. (EX1006, [0005], [0027]). Hurst discloses that when a mobile station "has nothing to transmit" it can intermittently transmit a DTX flag (also known as "DTXd") which indicates "whether it has used DTX on the downlink during the measurement period." (*Id.*, [0005]). This DTX flag can be measured, along with other network characteristics such as "signal level and bit error rate," by a terminal which then transmits the flag in a measurement report to the telecommunications network. (*Id.*, [0027]-[0028]). Hurst further 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.*, [0006], [0028]-[0032]; FIG. 4; EX1003, ¶70).

B. Motivation to Combine

A POSITA would have been motivated to combine the teachings of Frenger, Fischer, and Hurst to arrive at the claimed invention. (EX1003, ¶71).

As an initial matter, the prior art references are analogous art because they are in the same field of endeavor as the claimed invention and reasonably pertinent to

the particular problem with which the inventor is concerned. *Airbus S.A.S. v. Firepass Corp.*, 941 F.3d 1374, 1383 (Fed. Cir. 2019) (“Motivation to combine and the scope of analogous art are both factual inquiries underpinning an obviousness determination”); *In re Clay*, 966 F.2d 656, 658-659 (Fed. Cir. 1992) (“Two criteria have evolved for determining whether prior art is analogous: (1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.”).

First, 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, 10:30-56; EX1004, [0034], FIG. 1; EX1005, [0007]-[0008]; EX1006, [0026]; EX1003, ¶¶72-73). More specifically, the '544 patent and each reference involve the operation of wireless communication networks and contemplate, in part, a wireless device—commonly referred to as a “mobile station” (“MS”), a “terminal” or, “user equipment” (“UE”)—that measures signals transmitted from at least one base station—commonly referred to a “NodeB,” “eNodeB,” or “access point.”

Second, the '544 patent and each reference also disclose reporting information derived from the measured signals to the network to inform certain operational decisions, such as activation, handover decisions, system monitoring, and/or

network optimization. (EX1001, 2:25-3:2). Third, like the terminals disclosed in Frenger and Hurst, the terminal of the '544 patent measures signals from an idle base station and reports the measurements to the network. (*Compare* EX1001, Claim 1 *with* EX1004, [0030], [0034]-[0035] and EX1006, [0003]-[0005]).

A POSITA would also have been motivated to combine the prior art references because they are reasonably pertinent to the problem faced by the inventors of the '544 patent. (EX1003, ¶74). They all reasonably pertain to the problem of energy consumption. The '544 patent purports to “reduc[e] energy consumption,” (EX1001, 1:19-24) because “energy is considered as a significant part of the operation expenses of a cellular network” (*Id.*, 1:43-47). Similarly, Frenger provides that “[e]nergy consumption has long been an important issue for mobile terminals in cellular systems.” (EX1004, [0002]). It attempts to address this issue by enabling terminals to measure base station signals while the base station is idling (*i.e.*, employing Discontinuous Transmission (“DTX”) and Discontinuous Reception (“DRX”) cycles). (*See, e.g.*, EX1004, [0030], [0035]-[0038]). Hurst also discloses using DTX cycles to conserve power. Specifically, Hurst focuses on synchronizing DTX indication flags with corresponding signal measurements to prevent erroneous measurement results. (Ex1006, [0005], [0027]). Lastly, Fischer focuses on ensuring consistent signal measurements by providing measurement

configuration requirements to the terminal to manage the measuring process. (EX1005, [0038], [0079]).

In addition, as explained in greater detail below, a POSITA would have been motivated to modify Frenger's teachings in view of Fischer and Hurst because the solution of Frenger relies on accurate and consistent signal measurements, which the teachings of Fischer and Hurst facilitate through terminal configuration and synchronization methods. (*See infra* § IX.D; *see also e.g.*, EX1004, [0003]; EX1006, [0027]; EX1003, ¶75). For example, Frenger discloses transmitting both "[r]eference signals and synchronization signals" to identify an inactive base station because reference signals alone require "somewhat more effort" for a UE to detect, and synchronization signals alone would lead to less accurate measurements. (EX1004, [0061]). Frenger thus recommends a "preferred operation" that "transmit[s] both synchronization signals as well as reference signals" in order to facilitate more effective detection and more accurate measurements. (*Id.*; EX1003, ¶76).

Fischer discloses improved measurement techniques that a POSITA would have been motivated to use to further enhance the accuracy of Frenger's measurements. (EX1003, ¶77). For example, Fischer discloses (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, [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)).

Fischer further discloses providing the measurement report via the active terminal, (*see* EX1005, [0040] (disclosing that active base station (BS2) can send a wake up command to base station (BS1) over a base station interface); EX1003, ¶78), which a POSITA would have understood to be consistent with the power-saving objectives of Frenger and Hurst, as it would not require powering on additional inactive terminals in order to provide the measurement report to the network. Equipping the terminals of Frenger with a measurement report generator, as disclosed in Fischer, would enable Frenger to more efficiently and accurately communicate measurements over the network.

Fischer further teaches that its improved measurement techniques both improve consistency in measurement and reporting performance, as well as facilitate efficient communication of relevant information between the terminals and base stations. (EX1005, [0038], [0098] (“[terminal] 10 [] contains a consistent set of measurement configuration data, and it can perform measurements in accordance with the regular procedure”); EX1003, ¶78). A POSITA would have thus been

motivated to apply Fischer’s teachings regarding measurement reporting to Frenger’s terminals to more efficiently measure presence signals (e.g., reference signals) and organize the measurement results into a format that delivers consistent and accurate reports for transmission to the network. (*Id.*)

A POSITA would also have been motivated to further improve Frenger’s terminal based on Hurst’s teaching of a DTX flag. (EX1003, ¶79). Hurst discloses the use of a measurement report and teaches how to improve the accuracy of the report by including the DTXd flag (i.e., a “reporting identifier”). (EX1006, [0003]-0005]). Like Frenger and Fischer, Hurst teaches a terminal **(12)** that obtains and provides the measurement report. (EX1006, [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 discloses sending a measurement report from a terminal (MS) to the telecommunications network infrastructure. Specifically, Hurst teaches that “an active mobile station (MS) makes repetitive signal level and bit error rate [(quality)] measurements on the ‘downlink’ signal received from the serving cell base transceiver station (BTS),” and the BTS puts the measurements “into a Measurement Report” that is sent “to the base station controller (BSC).” (EX1006, [0002], [0005] [0026]).

Hurst improves upon the measurement report analysis of Frenger and Fischer by allowing for the system to receive a DTX flag (known as “DTXd”) measurement data that is “synchronised with the corresponding downlink measurement results from the MS.” (EX1006, [0005]; EX1003, ¶¶80-81). In particular, Hurst discloses 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” (e.g., the terminal). (EX1006, [0004]). Hurst thus teaches that two different levels of measurement may be applied 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.” (EX1006, [0004]). That is because “the FULL level measurement will be wrong if DTX has been used.” (*Id.*, [0003]).

Hurst’s DTXd flag is used to identify whether or not DTX has been employed during the measurement period so that the most accurate measurement technique may be employed. (*Id.*, [0005]; EX1003, ¶82). Because both Frenger and Fischer disclose using DTX and/or DRX, a POSITA would have understood that the accuracy of their measurements would be further enhanced by applying Hurst’s teachings relating to the DTXd flag. (See e.g., EX1004 (Frenger), [0035] (“the signals necessary for mobility and cell search should be intermittently transmitted”);

EX1005 (Fischer), [0021] (“the UE 10 may receive broadcasts of system information and paging information while the UE specifies a Discontinuous Reception (DRX)”).

C. Reasonable Expectation of Success

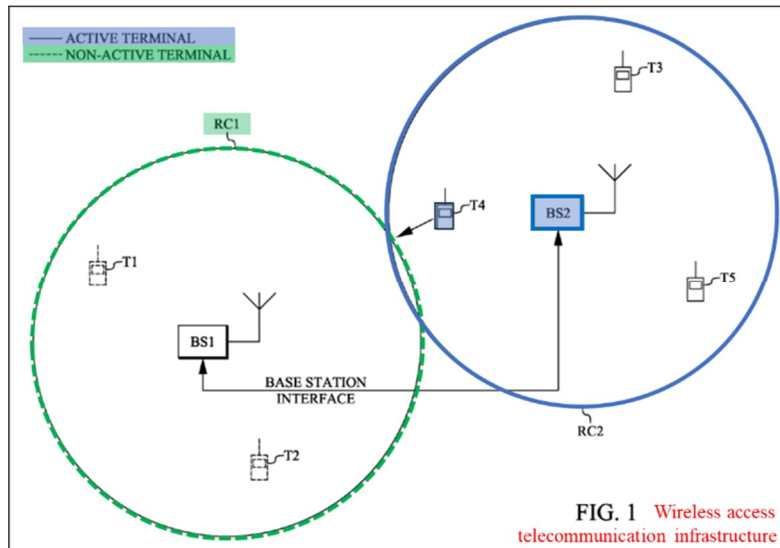
A POSITA would have reasonably expected success when combining Frenger, Fisher, and Hurst to arrive at the patented claims because the modifications simply entail software implementation well within the knowledge and capability of a skilled artisan. (EX1003, ¶83). Indeed, mere firmware updates are used to execute the functionalities of Frenger’s terminals. (EX1004, [0054], [0058]). A POSITA at the time of the ’544 patent would have understood that Frenger’s terminals could be programmed to receive measurement parameters, reporting parameters, and a reporting identifier from base stations, as disclosed in Fischer and Hurst. (EX1003, ¶¶83-84). Programming a terminal to perform certain functions is a known method yielding predictable results. (*Id.*)

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:”**

To the extent the preamble is limiting, Frenger discloses a *terminal* (*i.e.*, T4) *configured for operating in a wireless access telecommunication infrastructure*

(illustrated in FIG. 1) **comprising an active base station (i.e., BS2) and at least one inactive cell (i.e., RC1).** (EX1004, [0033]-[0034]; Fig. 1; EX1003, ¶¶85-86).



(EX1004, FIG. 1 (color annotations added)).

As indicated in the legend of FIG. 1, inactive terminals and inactive cells have dashed outlines and active terminals and active cells have solid outlines, demonstrating that BS2 is an active base station and RC1 is an inactive cell.

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

Frenger discloses terminals, “such as mobile stations, UEs (User Equipments), laptops, etc.” that comprise **a processor** (32). (EX1004, [0025], [0019] (“FIG. 9 is a block diagram illustrating an embodiment of a radio terminal”). Frenger explains 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.*, [0054] (emphasis added)). A POSITA would have understood from this

disclosure that processor 32 is *for executing instructions that cause the terminal to carry out operations* (i.e., to perform measurements). (EX1003, ¶¶87-88).

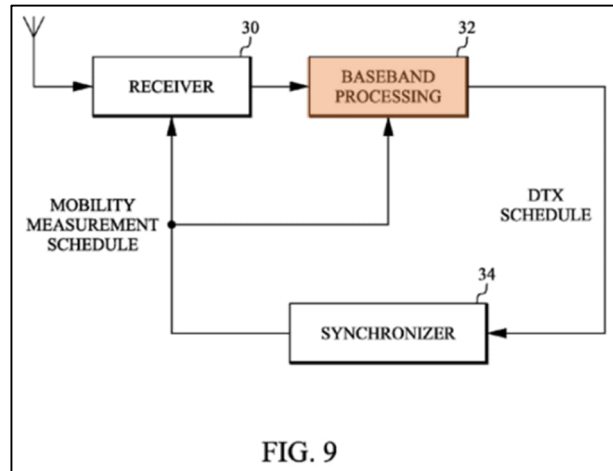


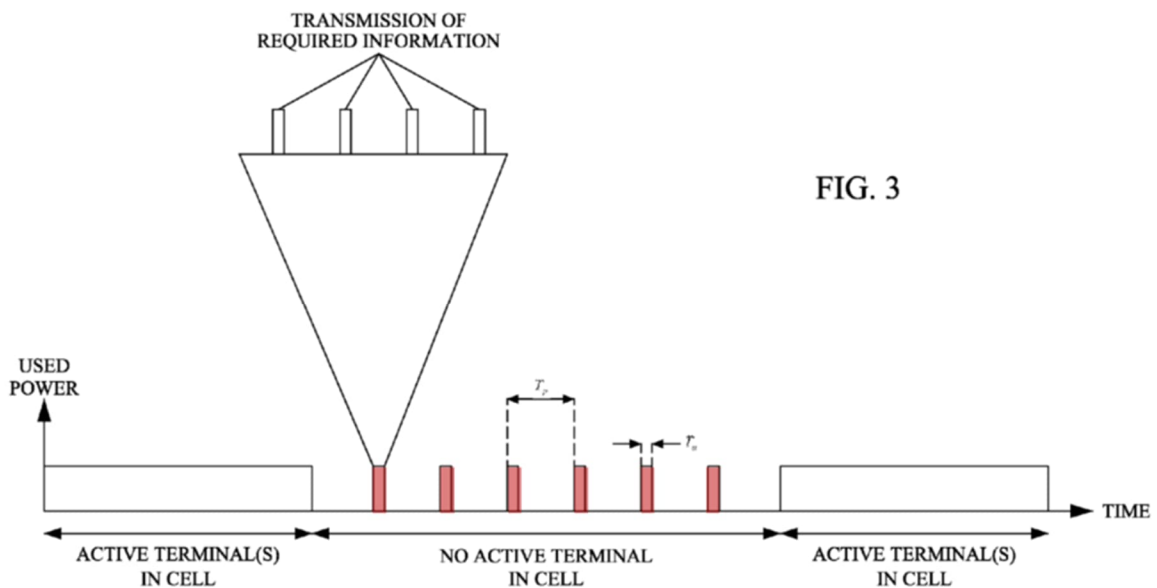
FIG. 9 (color annotations added).

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”

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

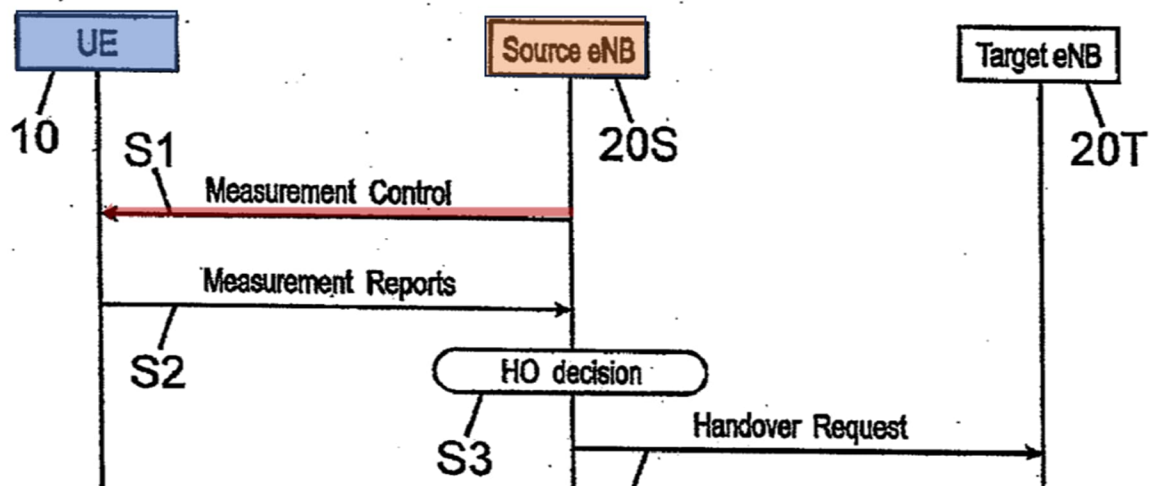
Frenger discloses that the *active base station* (BS2) *transmits*, and the *terminal* (T4) *receives*, certain *measurement parameters*, such as *when* to perform the measurements. (EX1004, [0054]-[0055]; EX1003, ¶¶89-92). According to Frenger, “[a]n active terminal . . . may be instructed by a base station to perform measurements at time instants that lie in time periods T_a .” (*Id.*, [0054], [0056] (terminal receives DTX schedule “from an active base station”)). The measurements

should be performed at time period T_a because that is when the idle base stations intermittently transmit presence signals. (*Id.*, [0035] (“Despite being in idle mode, the signals necessary for mobility and cell search should be intermittently transmitted . . . every T_a .”), [0038], FIG. 3). Active terminals measure these presence signals from the idle base station to locate idle cells and measure and report signal information from presence signals to facilitate a decision by the telecommunications infrastructure about whether to wake up the idle base station if the terminal moves into the area covered by the idle cell. (*See id.*, [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.”)).



(EX1004, FIG. 3 (T_a annotated in pink)).

To the extent Patent Owner argues Frenger does not disclose this limitation, Fischer does. (EX1003, ¶¶93-94). Fischer teaches 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)). (EX1005, [0090]). According to Fischer, “MeasurementConfiguration information elements”—transmitted to the UE 10 as part of “MEASUREMENT CONTROL messages”—contain “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, [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, [0071]).



(*Id.*, FIG. 4 (excerpted and color annotations added)).

- ***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***

Frenger discloses that ***the received measurement parameters and/or reporting parameters trigger the terminal*** (UE 10) ***to obtain information regarding a presence signal from the at least one inactive base station*** because it tells the active terminal T4 ***when*** to measure the presence signals from the idle base station BS1 (i.e., at time period T_a). (EX1004, [0054], [claim 17]; EX1003, ¶95).

To the extent Patent Owner argues that Frenger fails to disclose this limitation, Fischer does. Fischer discloses that ***the received measurement parameters and/or reporting parameters*** (Measurement Control Messages S1) ***trigger the terminal*** (UE 10) ***to obtain information regarding a presence signal from the at least one inactive base station***. As described above, 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, [0071] (emphasis added)). Based on this description, a POSITA would have understood the reporting criterion to “trigger” the terminal to begin measuring presence signals from a base station. (EX1003, ¶96).

Further, Fischer explains that the MEASUREMENT CONTROL messages (S1) include “measurement identity (ID) elements, measurement object elements and reporting configuration elements.” (*Id.*, [0025]). Fischer discloses 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, [0078]). The measurements conducted on the received signals include, for example, “evaluating a reference signal received power (RSRP) or a reference signal received quality (RSRQ),” (i.e., *presence signals*). (EX1005, [0066]).

A POSITA would have been motivated to design the terminal of Frenger to perform signal measurements according to certain measurement and reporting parameters, as disclosed in Fischer, with a reasonable expectation of success. (EX1003, ¶97; *supra* §§ VIII.B-C).

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

Frenger discloses *receiving presence signals transmitted from the at least one inactive base station* BS1. (EX1003, ¶¶98-100). Specifically, it 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, [0052] (emphasis added)). These signals are the same “presence signals” that the ’544 patent discloses. (EX1001, 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)”).

Frenger further discloses that a terminal ***receives the presence signals***. For example, Frenger explains that “[t]erminals regularly scan for neighboring cells” and “active terminals typically also report the ***received signal strength of the reference signals*** (RSRP (Reference Signal Received Power) measurements) transmitted by the neighboring cells to the network.” (EX1004, [0030]).

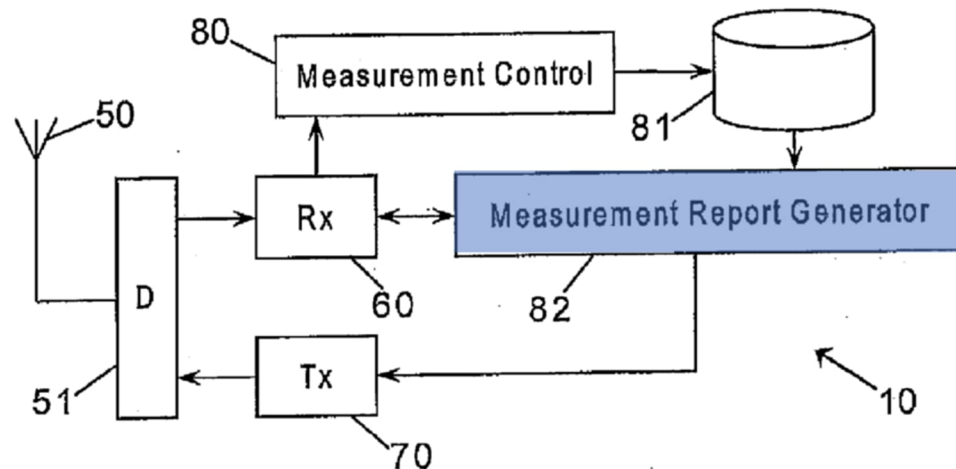
5. **1[d]: “obtaining a measurement report regarding the presence signal transmitted from the inactive base station and;”**

As discussed above, Frenger discloses ***presence signals*** (i.e., reference (pilot) signals, synchronization signals and broadcasted system information) ***transmitted from the inactive base station*** (e.g., BS1). (EX1003, ¶¶101-103). Per Frenger, even when a base station is in idle mode (i.e., ***inactive base station***), “the signals necessary for mobility and cell search”—e.g., ***presence signals*** such as reference signals—“should be intermittently transmitted.” (EX1004, [0034]-[0035]). “This can be accomplished by defining a DTX (Discontinuous Transmission) cycle for the [idle] base station,” and “the DTX cycle is defined such that the base station is active every T_a out of T_p seconds.” (*Id.*, [0035]). According Frenger, “ T_a should be selected large enough to allow the terminal [T4] to find synchronization with . . . [and] do [presence] signal measurements on the cell [RC1].” (*Id.*, [0036]).

Frenger further discloses the terminal (T4) ***obtains a measurement report regarding the presence signals***. In Frenger, 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, [0030] (emphasis added)). In Frenger, the ”neighboring cells” can be inactive cells RC1 served by inactive base stations BS1. EX1004, [0038] (“If terminals wake up according to a certain pattern to perform neighboring cell measurements, it is beneficial if the DTX pattern in the [idle] base station matches this pattern.”).

To the extent Patent Owner argues that Frenger’s report of the RSRP measurements does not constitute a measurement report, this limitation is obvious in view of Fischer. (EX1003, ¶¶104-105). Fischer’s UE (10) includes a measurement report generator (82) that ***obtains a measurement report*** by compiling 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, [0077]-[0079]).

FIG 3



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

For the reasons discussed above in Sections VIII.B-C, a POSITA would have been motivated to apply Fischer’s teachings regarding measurement reports to Frenger and would have reasonably expected the combination to succeed. *Supra* §§ VIII.B-C.

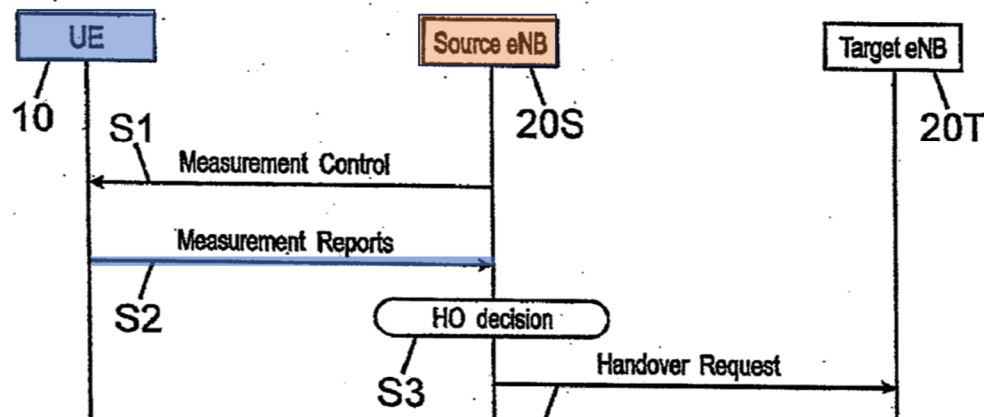
6. 1[e]: “providing the measurement report to the telecommunications infrastructure via the active base station,”

Frenger discloses 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 [i.e., *provide the measurement report*] to the network [i.e., the *telecommunications infrastructure*].” (EX1004,

[0030] (emphasis added); EX1003, ¶¶106-107). The active terminal T4 operates in the cell RC2 managed by the active base station BS2. (EX1004, FIG. 1, [0027]).

Alternatively, it would have been obvious to a POSITA to provide the measurement report via the active base station in view of Fischer. (EX1003, ¶¶108-109). As discussed above for limitation [1d], Fischer discloses obtaining a measurement report at a terminal. *Supra* § VIII.D.5. Fischer further teaches that the terminal (10) ***provides the measurement reports (S2) to the network via an active base station*** (Source eNodeB 20S). (EX1005, [0090], FIG. 4). In Fischer, once the 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.*, [0090]). The measurement report is transmitted from the UE 10 to the network. (See *id.*, [0067], claim 9 (“trigger a measurement report from the mobile station to the network”). FIG. 4 illustrates that “[t]he UE 10 is [] triggered to send MEASUREMENT REPORT messages (step S2) according to the rules set by the measurement configuration data.” (EX1005, [0090]).

FIG 4



(EX1005, FIG. 4 (color annotations added)).

For the reasons discussed above in Sections VIII.B-C, a POSITA would have been motivated to modify (with a reasonable expectation of success) Frenger's system and method to forward the measurement report from the terminal T4 to the active base station (BS2) to provide the network with information needed to decide whether to wake up the inactive base station (BS1). (See EX1004, [0040] (disclosing that active base station (BS2) can send a wake up command to base station (BS1) over a base station interface); EX1003, ¶109).

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;”**

Frenger discloses an *inactive base station* BS1 operating in Discontinuous Transmission (“DTX”) mode “defined such that the base station is active every T_a

out of T_p seconds.” (EX1004, [0035]; EX1003, ¶¶110-111). “At least one of [the presence signals] has to be transmitted during the time periods T_a .” (EX1004, [0052]). 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, [0054]-[0055]). As explained above, *supra* § VIII.D.3, this measurement period occurring during T_a is “a probing period,”—“[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,” according to the ’544 patent. (EX1001, 3:2-5).

However, as Hurst discloses, “[t]he use of DTX during a measurement period clearly affects the signal level measured by the receiving entity (MS for the downlink).” (EX1006, [0003]). Based on this disclosure, a POSITA would have understood that if Frenger’s terminal T4 measures on the base station BS1 without knowing whether the base station is operating in DTX (intermittent transmission) or CTX (*i.e.*, continuous transmission) mode, the signal strength analysis could be wrong. (EX1003, ¶112; EX1006, [0003] (“the FULL measurement will be wrong if DTX has been used on the [traffic channel]”).

Although Frenger contemplates providing the base station’s DTX schedule to terminal T4, (EX1004, [0056]) a POSITA would have understood that the actual DTX transmissions can become irregular and inconsistent with the predetermined

schedule over time. (EX1003, ¶113). Further, 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, [0034]). Because a predetermined schedule would not account for this occurrence, the measurement report could be misinterpreted.

Consequently, 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, [0005] (“This flag is called DTXd”); EX1003, ¶114). Hurst explains that 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.*, [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.*)

Combining the teachings of Frenger, Fischer, and Hurst would enable Frenger’s terminal T4 to determine during each measurement period (*i.e.*, **probing period**) whether DTX was used, reducing the risk of inaccurate measurement reporting. (EX1003, ¶115).

Also for the reasons discussed above in Sections VIII.B-C, a POSITA would have been motivated, with a reasonable expectation of success, to enable the terminal taught by the combination of Frenger and Fischer to receive a DTX flag, as disclosed in Hurst, because it informs the terminal about *how* it should measure the signals—*i.e.*, using a FULL level measurement or using a SUBSET level measurement. (EX1003, ¶115).

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

For Hurst’s terminal (MS) to utilize the DTX flag (DTXd), to perform a FULL or SUBSET level measurement, it must necessarily recognize the DTX flag. (EX1004, [0003]-[0005]); EX1003, ¶¶116-117). Thus, as discussed above (*see supra* § VIII.D.7), a POSITA would have been motivated to ensure that Frenger’s terminal T4 is configured to recognize DTX flags and schedules, when combined with the teachings of Fischer and Hurst. (EX1003, ¶117).

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.”

• *including the reporting identifier in the measurement report*

As discussed above, *supra* § VIII.D.6, the combination of Frenger and Fischer teaches a terminal that provides a “measurement report” to the telecommunications network infrastructure. (EX1003, ¶¶118-119). As discussed above, *supra*

§ VIII.D.7, Hurst discloses a measurement report that includes a DTX flag “reporting identifier.” (EX1006, [0027]-[0028]). Specifically, Hurst discloses 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, [0005]). Hurst’s “downlink DTXd flag from the BTS 16 is synchronized with the corresponding downlink measurement results from the MS.” (EX1006, [0027]). The measurements, including DTXd are “combined by the BTS 16 into a Measurement Report signalling message . . . to the BSC 22.” (EX1006, [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***

The Frenger-Fischer-Hurst combination further teaches that the DTX flag would ***indicate that the measurement report was not obtained as part of a handover to the inactive base station*** because the DTX flag information is received by the telecommunications network before any handover decisions are ever made. (*Id.*, [0005]). Further, handover decisions involve switching from DTX mode to CTX mode, which does not occur when determining whether a measurement occurred during a DTX probing period. (See EX1004, [0044] (if a handover request is

detected, the base station is instructed “to leave DTX mode, and to enter normal CTX mode;” EX1003, ¶120).

As discussed above, a POSITA would have been motivated to include a DTX flag (i.e., reporting identifier) in the measurement report of the Frenger-Fischer combination, as disclosed in Hurst, with a reasonable expectation of success. (*Supra* §§ VIII.B-C and VIII.D.9; EX1003, ¶121). 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 if they were focused on the intended uses expressly disclosed in Hurst, “[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.*, [0006], [0028]-[0032]; FIG. 4; EX1003, ¶121).

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

Nylander discloses a “mobile telecommunication network [that] comprises macro base stations and at least one Energy Efficient Base Station (EEBS).” (*Id.*, [0014]; EX1003, ¶122). 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 can “determine an identity of an EEBS in sleep mode.” (*Id.*, [0014-15]).

Kim discloses that a “base station informs the terminal of the decided DRX/DTX parameter and the measurement information report parameter,” then “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 reports the measured information. (EX1008, 17:2-4, 17:15-19; 6:21-25; EX1003, ¶123). The measurements include “channel qualities of the serving cells and neighbor cells,” “control signal blocks,” and “radio resources information.” (EX1008, 21:1-5).

Lin discloses a method of detecting discontinuous transmission (DTX) in a communication system. (EX1009, 1:11-29; EX1003, ¶124). In Lin “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). The variables include energy per bit to noise power ratio and re-encoded symbol energy (i.e., reporting identifiers). (*Id.*, 3:34-39). The multi-dimensional signal metric is used to provide accurate DTX detection. (*Id.*, 11:58-60, 7:34-36).

As detailed below, a POSITA would have been motivated to combine the teachings of Nylander, Kim, and Lin to arrive at claim 1 of the '544 patent. (EX1003, ¶125).

A. Overview of Prior Art

1. Nylander (EX1007)

The PCT application that published as Nylander was filed on June 24, 2009 and published on May 3, 2012. Nylander thus qualifies as prior art under at least 35 U.S.C. § 102(e). (EX1003, ¶126).

Nylander, like the '544 patent, is related to “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, [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”)). (EX1003, ¶127). Specifically, Nylander discloses a cellular network containing 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.*, [0002], [0032]-[0033]). 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.*, [0014]; [0033]). Nylander discloses that the UE may detect the sleeping base station following an extended search, and the UE may indicate to the mobile

telecommunication network that “the EEBS should wake up from sleep mode and return to regular operation.” (*Id.*, [0038], [0048], Fig. 5).

2. Kim (EX1008)

The PCT application that published as Kim was filed on January 3, 2008 and published in English on July 17, 2008. Kim thus qualifies as prior art under at least 35 U.S.C. § 102(b). (EX1003, ¶128).

Kim relates to “reporting measurement information about a serving base station and neighbor base stations in a packet-based communication system.” (EX1008, 7:1-5; EX1003, ¶129). Kim discloses a packet-based cellular network system, such as a 3GPP LTE system, in which “the terminal 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.*, 2:18-20; 17:15-19; 2:18-20 (“a 3rd-Generation Partnership Project (3GPP) Long Term Evolution (LTE) system is a packet-based system providing services”)). Kim explains that measurements “should be carried out while the terminal maintains the DRX/DTX periods for power-saving operation,” (*Id.*, 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.*, 8:32-35).

3. Lin (EX1009)

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). (EX1003, ¶130).

Lin relates to a method for detecting discontinuous transmission (DTX) from a base station over a communication channel, such as a CDMA channel. (EX1009, 3:48-50; (EX1003, ¶131). Lin teaches a mobile station 130a that “receives, demodulates, and decodes” a signal from a base station. (*Id.*, 5:33-35). “The decoded bits are coupled to a DTX detector 250,” which uses signal characteristics of the received signal to help make the DTX determination.” (*Id.*; 7:27-33). “Multiple variables are generated from the received signal, including an energy per bit to noise power ratio and a normalized re-encoded symbol energy. (*Id.*, 5:38-41, 9:8-12). Specifically, “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.*, 9:54-58). These variables (i.e., reporting identifiers) are used in a two-dimension signal quality metric used to “provide accurate DTX detection.” (*Id.*, 11:58-60).

B. Motivation to Combine

A POSITA would have been motivated to combine the teachings of Nylander, Kim, and Lin to arrive at the claimed invention. (EX1003, ¶¶132-138).

Like the '544 patent, Nylander discloses methods and arrangements in a 3G or LTE cellular telecommunication system for “interference reduction and energy saving.” (EX1007, [0001]). Specifically, Nylander teaches a “mobile telecommunication network [that] comprises macro base stations and at least one Energy Efficient Base Station (EEBS).” (*Id.*, [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 can “determine an identity of an EEBS in sleep mode” by prolonging the UE’s search period to detect the sleep mode EEBS’s transmissions. (*Id.*, [0014-15]).

Kim discloses a method whereby a terminal “report[s] measurement information about a serving base station and neighbor base stations in a packet-based communication system,” (EX1008, 6:21-25), such as a “3rd-Generation Partnership Project (3GPP) Long Term Evolution (LTE) system, (*id.*, 2:18-20). According to the method, “the base station informs the terminal of the decided DRX/DTX parameter and the measurement information report parameter.” (EX1008, 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. (EX1008, 17:15-19). The measurements include “channel qualities of

the serving cells and neighbor cells,” “control signal blocks,” and “radio resources information.” (EX1008, 21:1-5).

Lin discloses 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, 1:11-29). Lin’s method includes generating 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.*, 3:34-39). To generate the two-dimensional quality metric, 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). The multi-dimensional signal metric is used to provide accurate DTX detection. (*Id.*, 11:58-60, 7:34-36).

These references are in the same field of endeavor as each other and the ’544 patent.

Like the ’544 patent, each prior art reference discloses wireless telecommunication networks, such as a third generation (3G) Long Term Evolution (LTE) network and W-CDMA. (*Compare* EX1001, [38-41] *with* EX1007, [0002],

[0034] *and* EX1008, 6:21-25 *and* EX1009, 1:19-29). Nylander, Kim, Lin, and the '544 patent each contemplates base stations that cover cells and wireless devices, such as cellular phones, that measure signals transmitted from at least one base station. (EX1003, ¶133)

Further, Nylander, Kim, Lin and the '544 Patent all focus on energy conservation in a telecommunications network. (EX1003, ¶134).

The '544 patent “relates to the field of activating inactive cells of telecommunication infrastructure for purposes such as controlling energy consumption.” (EX1001, 1:20-24). And Nylander’s “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, 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.*, [0023]).

Kim teaches “efficiently reporting measurement information” to “execut[e] a power-saving operation.” (EX1008, 1:06-13). Kim’s “terminal executes a power-saving operation based on DRX and /or DTX parameters in DRX/DTX operation. (*Id.*, 4:11-13). Although Kim’s power saving operation focuses on the terminal and not the base stations, a POSITA would have recognized the benefit of using the same

reporting measurement system in Nylander's network infrastructure. (EX1003, ¶134).

Lin also discloses the use of DTX intermittent transmissions to avoid overallocation of resources and reduce interference levels. (EX1009, 1:49-52, 2:25-30).

A POSITA would also have been motivated to apply Kim's teachings relating to measurement reports to Nylander's system. Kim discloses that measurement reports may be used "for efficiently reporting measurement information on a serving cell and neighboring cells." (EX1008, 6:5-7); (EX1003, ¶135). A POSITA would have also understood that a measurement report can be used to inform the network about the base station's status, channel quality and/or signal strength to better assist the network decide whether to activate a base station in sleep mode. (EX1003, ¶135). As such, including measurement reports in Nylander's system would help improve the efficiency of Nylander's network. (*Id.*).

In addition, a POSITA would have known that taking measurements according to Kim's disclosed measurement parameters can help improve upon the energy conservation goals of Nylander. For instance, Kim teaches that a terminal in a power-saving operation can be instructed to only report measurement information corresponding to a "DRX/DTX period according to a pre-established measurement information report parameter." (EX1008, 10:21-24). This is beneficial in order for

the terminal to “efficiently report the measurement information . . . [o]therwise, the report of measurement information may collide with the power-saving operation.” (*Id.*, 8:32-9:2). A POSITA would therefore have understood that taking measurements according to parameters can help improve the energy conservation goals as expressed in Nylander and Kim. (EX1003, ¶136).

A POSITA would have also been motivated to combine the teachings of Nylander and Kim to incorporate a measurement and reporting process, as taught by Kim, into the telecommunications method of Nylander because doing so would facilitate “efficiently reporting measurement information on a serving cell and neighboring cells which is required for an active-state terminal executing power-saving operation[s].” (EX1008, 6:5-10; EX1003, ¶137). Measuring signal information from an inactive base station, as Kim teaches, would also help facilitate the goals of Nylander—namely, to determine when to wake up a sleeping base station. (EX1007, [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, considering information obtained from measuring the reference signals transmitted by the HN could also inform the decision whether to wake up the HN. (EX1003, ¶137). Further, providing parameters for the measuring and reporting processes would not only improve the consistency and accuracy of the measurements obtained but would also facilitate efficient

communication of relevant information between the terminals and base stations. (*Id.*).

In addition, a POSITA would have 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, 9:8-12; EX1003, ¶138). "In 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.*, 4:32-35). To inform the terminal about when the DTX transmission occurs on the forward link, Lin discloses that DTX detection occurs at the receiver. (*Id.*, 4:35-41). This enables the mobile station's DRX measurements to synchronize with the base stations DTX transmissions. (EX1003, ¶138). It also enhances the accuracy of requests for transmit power adjustment that the mobile station sends to the base station transmitter. (EX1009 3:9-27).

C. Reasonable Expectation of Success

A POSITA would have reasonably expected the successful combination of Nylander, Kim, and Lin in the manner discussed above because the modifications merely entail software implementations that are well within the knowledge and capability of a skilled artisan. (EX1003, ¶139). 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, [0031]).

Implementation of Kim’s teachings would also have been straightforward, as it would involve an application of a known technique to solve similar problems with predictable results. (EX1003, ¶140). Kim’s disclosed 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, 21:33-22:2). Likewise, Lin 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, 12:1-5; EX1003, ¶141). 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.*, 12:9-14).

Thus, based on the teachings disclosed in Nylander, Kim, and Lin, 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. (EX1003, ¶142).

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:”

Nylander discloses *a terminal* (UE (108)) *configured for operating in a mobile telecommunication network* (Fig. 1b), which includes *wireless access telecommunication infrastructure*. (EX1007, Fig. 1b, [0033], [0014], [0005] (“[t]hrough this setup[,] a mobile terminal, also known as user equipment (UE), communicates via the home node (HN) and the core network” (emphasis added); EX1003, ¶¶143-144). Nylander’s telecommunication infrastructure *comprises 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.*, [0033], FIG. 1b, [0032] (“the term energy efficient base station will be abbreviated EEBS”)).

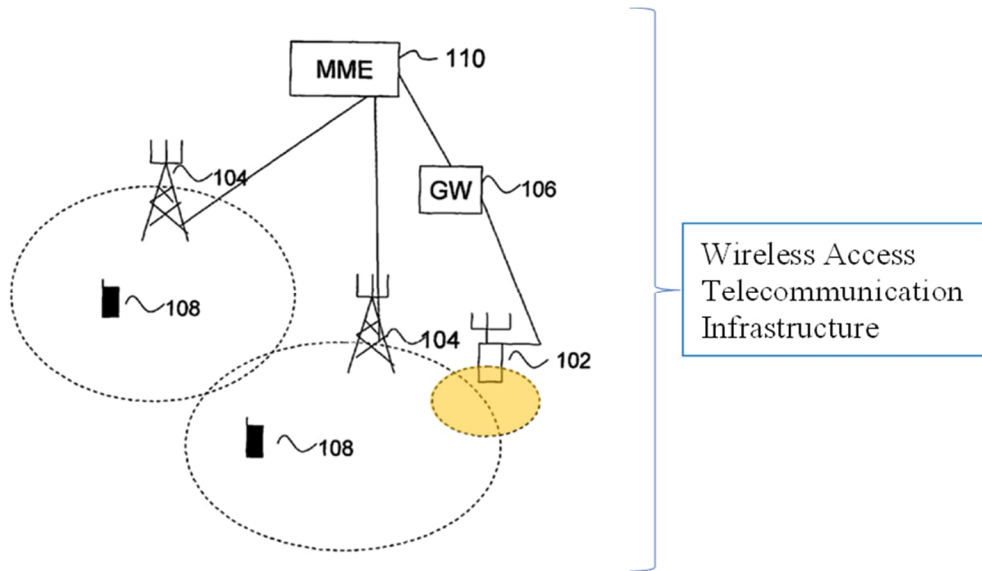


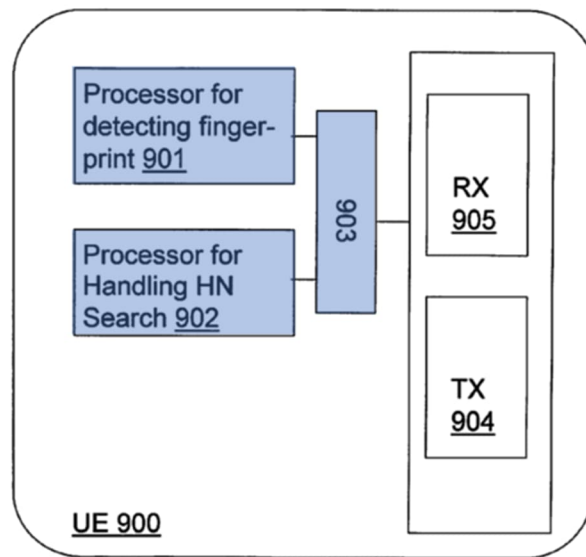
Fig. 1b (color annotation added).

The EEBS of Nylander “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.*, [0014]; [0033]). Nylander discloses that EEBSs are “turned off, say 90% of the time.” (*Id.*, [0042]; EX1003, ¶145).

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

Nylander discloses a terminal (108, 900) comprising *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). (EX1003, ¶¶146-147). Specifically, Nylander provides “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, [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 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”**

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

Nylander in view of Kim renders this limitation obvious. (EX1003, ¶¶148-149). Kim discloses a terminal receiving a DRX/DTX parameter and a measurement information report parameter at step S406. (EX1008, 17:2-4 (“In step S406, the base

station informs the terminal of the decided DRX/DTX parameter and the measurement information report parameter.”). 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.*, 10:33-11:1; 17:2-4; Fig. 4). The “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.*, 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.” (EX1008, 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 inactive base station***

Nylander discloses that when a 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, [0048]). “The purpose of extending the search is to facilitate discovery of an HN that is in sleep mode [(i.e., EEBS)].” (*Id.*, [0048]).

“[D]uring the sleep mode . . . the EEBS transmits its reference signal and system information less frequently than during regular operation.” (*Id.*, [0040]). And a POSITA would have understood from this disclosure that the “extensive search [] for the HN” includes measuring the reference signals from an HN in sleep mode (i.e., EEBS). (EX1003, ¶150). Note, a “reference signal” is a “presence signal.” (EX1001, 4:44-64).

To the extent that Patent Owner argues that a “fingerprint” is not a “measurement parameter and/or reporting parameter,” Kim teaches that upon DTX/DRX parameters and a measurement information report parameter (i.e., *receiving the measurement parameters and/or reporting parameters*), *the terminal is triggered to obtain information regarding a presence signal from the at least one inactive base station*. (EX1008, 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”); 8:32-35 (terminal “should report measurement information at a period related to the DRX and DTX periods to efficiently report the measurement information.”; EX1003, ¶151).

Kim further explains 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.*, 11:21-30).

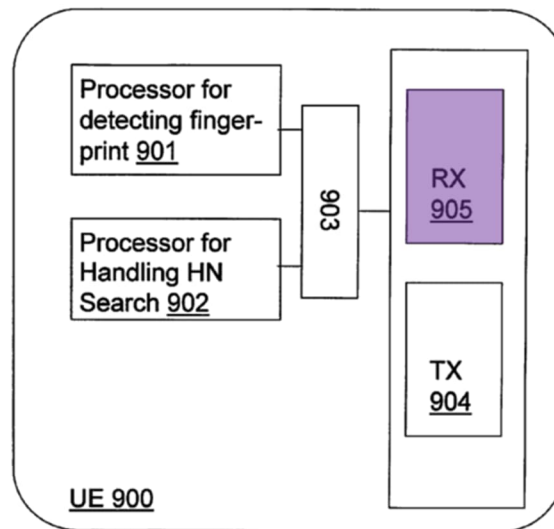
A POSITA would have understood this measurement information to be “presence signals,” consistent with the types of presence signals disclosed in the ’544 Patent. (EX1001, 4:44-64 (disclosing that a “presence signal” may include “system information” such as “cell identity, power level of its beacon signal, etc.”); EX1003, ¶152).

As discussed above, *supra* §§ X.A-B, a POSITA would have been motivated to combine, with a reasonable expectation of success, the teachings of Nylander and Kim to incorporate a measurement and reporting parameter, as taught by Kim, into the telecommunications method of Nylander and to require the measuring terminal of Nylander to take measurements according to, or consistent with, certain measurement and/or reporting parameters, as disclosed in Kim. (EX1003, ¶153; *supra* §§ IX.B-C).

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

Nylander discloses a terminal (108) *receiving a* reference signal (i.e., *presence signal*) *transmitted from the at least one inactive base station* (102). (EX1007, [0097] (discloses a terminal comprising “a receiver 905 for receiving transmissions from base stations”); EX1003, ¶¶154-155). Specifically, Nylander teaches that “[t]he 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 (***presence signals***) less frequently than during regular operation, and the UE is allowed to access the at least one EEBS.” (EX1007, [0021]). The receiver 905 receives transmission from base stations. (EX1007, [0097]).



(EX1007, Fig. 9 (color annotations added)).

Likewise, as explained above for limitation 1[b], Kim discloses a terminal obtaining signals relating to “radio channel quality,” “time taken for the measurement,” and “the interference level from the neighbor cells” (*id.*, 11:21-30), which a POSITA would have understood this measurement information to be “presence signals,” consistent with the types of presence signals disclosed in the ’544 Patent, (EX1003, ¶156).

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

Nylander in view of Kim renders this limitation obvious. (EX1003, ¶¶157-161). Kim discloses a terminal that *obtains a measurement report regarding transmissions* (e.g., signals) *that it receives from a base station*. (EX1008, 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”); 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, . . .”)).

As explained above, Kim further explains 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.*, 11:21-30). A POSITA would have understood this measurement information to be “presence signals,” consistent with 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.”; EX1003, ¶159).

Kim further explains 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.*, 9:24-33). Kim teaches that “the base station can direct the terminal to report measurement information along with the transmission of packet data.” (*Id.*, 10:25-27, 20:27-33).

As discussed above, *supra* §§ 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 the terminal (108) of Nylander obtains a measurement report (as Kim teaches) regarding the reference signals (*i.e.*, “**presence signals**”) transmitted from the sleeping base station (102) disclosed in Nylander. (EX1003, ¶161).

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

Nylander discloses an **active base station** (104), but does not expressly disclose that it provides a measurement report to the telecommunications infrastructure. However, Kim teaches a terminal **providing the measurement report to the telecommunications infrastructure via the active base station**. (EX1008, 20:27-33 (“terminal . . . reports the measurement information to the serving base

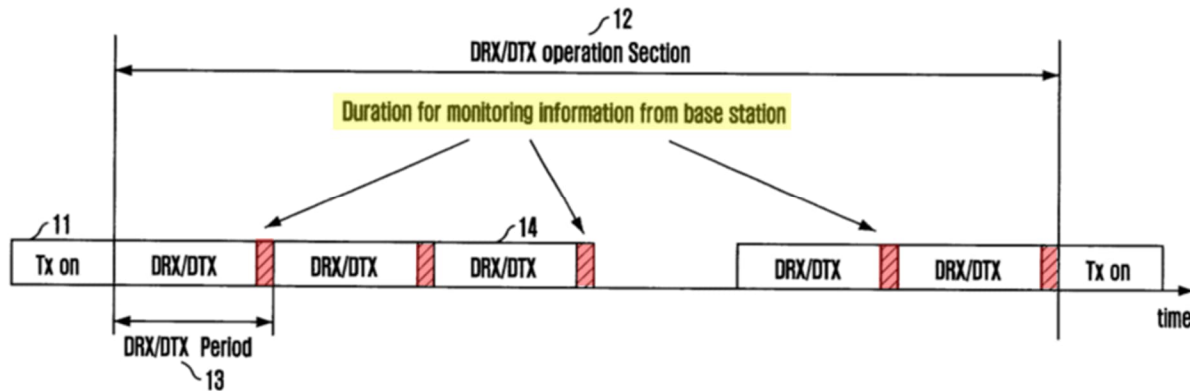
station [(i.e., active base station)] by using radio resources allocated by the serving base station”); *see supra* § IX.D.5). The measurements would include “channel qualities of the serving cells and neighbor cells.” (EX1008, 21:01-02; EX1003, ¶¶162-163).

As discussed above, *supra* §§ X.A-B, a POSITA would have been motivated to combine, with a reasonable expectation of success, the teachings of Nylander and Kim such that terminal (108) of Nylander would provide a measurement report including a wake-up indication it sends to the mobile telecommunication network via the macro base station (104), as disclosed in Kim. (EX1003, ¶164).

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;”**

As explained above for limitation 1[c], Nylander discloses a terminal (108) ***receiving a*** reference signal (i.e., ***presence signal***) ***transmitted from the at least one inactive base station*** (102). (EX1003, ¶¶165-167; *supra* § IX.D.4). Specifically, Nylander teaches that “[t]he 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, [0021]). From this disclosure, a POSITA would have understood that Nylander’s EEBS is operating 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, FIG. 1; EX1003, ¶167). As discussed above, one major advantage of operating in DRX/DTX mode is power savings at the base stations and terminals. (EX1008, 4:11-20).

However, as Lin recognizes, 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, 4:32-36; EX1003, ¶168). “The 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.*, 2:1-3). To that end, Lin discloses 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.*, 5:33-38).

Lin's "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." (EX1009, 7:32-36). "A receiver in the MS 130a receives, demodulates, and decodes the signal in order to recover the data." (*Id.*, 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.*, 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). (EX1009, 9:1-12; EX1003, ¶169).

Because Lin's "DTX detection may be implemented directly in the MS when the DTX transmission occurs on the forward link," a POSITA would have interpreted the data variables (e.g., X, Y) two-dimensional signal quality metric (i.e., reporting identifier) to ***indicate that the inactive base station*** was transmitting data (i.e., ***in a probing period***). (EX1003, ¶170).

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

Nylander in view of Kim and Lin renders this limitation obvious. (EX1003, ¶¶171-172). "A receiver in the MS 130a receives, demodulates, and decodes the signal in order to recover the data. (*Id.*, 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.*, 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). (EX1009, 9:1-12). A POSITA would have understood that in order to recover the data and generate multiple variables from the received signal, the terminal MS 130a necessarily must have “recognized” the variables (i.e., reporting identifiers).

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.”

This limitation is rendered obvious by the combination of Nylander, Kim, and Lin. (EX1003, ¶¶173-177). Nylander describes a terminal (108) that detects a “reference signal and system information” transmitted from a base station (102) in sleep mode. (EX1007, [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”); *see supra* § IX.D.4). 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, 8:32-35).

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

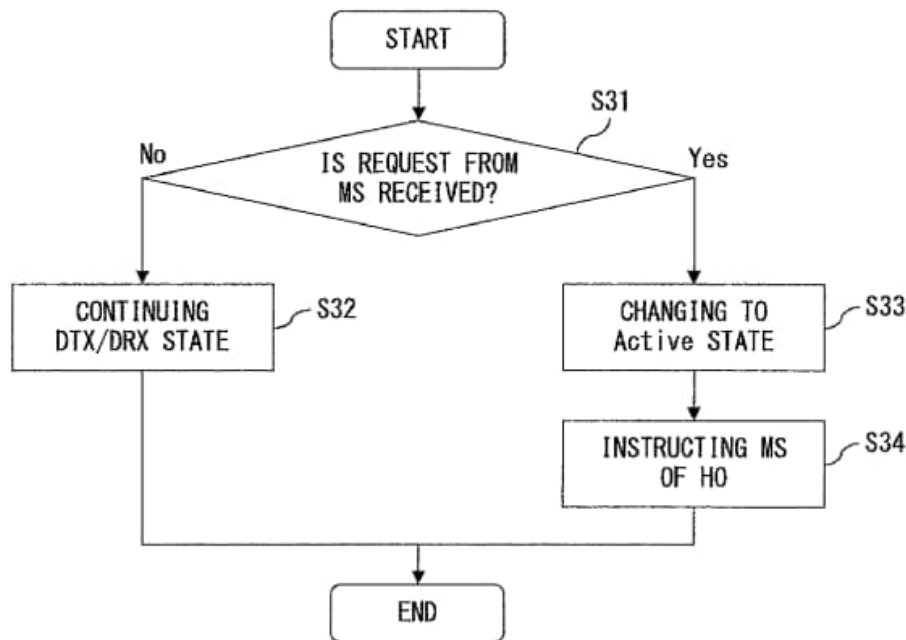
Lin contemplates systems based on code division multiple access (CDMA), which may be designed to support 3rd Generation Partnership Project (3GPP). (EX1009, 1:12-29). According to Lin, “[a] typical CDMA communication system uses closed loop power control” where “a transmission is made, a measurement is made at the receiver, and ***feedback is provided to the transmitter.***” (*Id.*, 2:31-38 (emphasis added)). Specifically, [i]n closed loop power control, the receiver . . . calculates a metric that is based on the quality of the received signal.” (*Id.*, 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.*, 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.*, 2:49-51 (emphasis added)). As explained above, with respect to limitation 1[f], the energy per bit to noise power ratio is a “reporting identifier,” which can be used to determine whether a DTX transmission from a base station in DTX mode is taking place. (*Supra* § IX.D.7).

Although Lin does not disclose that the reporting identifier is transmitted to the base station transmitter in a measurement report, a POSITA would have been motivated to include it in the measurement report of the Nylander-Kim system with a reasonable expectation of success. (*Supra* § IX.B-C). Indeed, a POSITA would have understood that a measurement report is 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. (EX1003, ¶176).

- ***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***

Because Lin's variables: "[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), (EX1009, 9:1-12), are used to indicate the occurrence of a DTX transmission from the base station, a POSITA would have understood that the measurement was not obtained as part of a handover to the inactive base station, (EX1003, ¶177). Indeed, handover cannot occur during intermittent communication (e.g., DTX). (See e.g., EX1010, 1:46-56; EX1003, ¶177). "[I]f 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, FIG. 16).

FIG. 16 of Tajima illustrates 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, 12:30-34). If a handover request is not received, the mobile station 2 and base station continue in DTX/DRX mode. (See *id.*, 12:26-29, 9:22-31).

X. THE BOARD SHOULD NOT EXERCISE ITS DISCRETION TO DENY INSTITUTION

A. *Fintiv*

Fintiv Factors 1-5—concerning effects on (and of) parallel district court litigation—all favor institution because ***there is no parallel litigation*** between

Petitioners and Patent Owner. Petitioners have filed a separate action concerning non-infringement of the '544 patent but Petitioners did not challenge the validity of the '544 Patent. Further, the Petition's merits are compelling (Factor 6), which alone demonstrates that the PTAB should not discretionarily deny institution under Fintiv.

B. § 314(a)

The Board should not exercise discretionary authority under § 314(a). There have been no previous or current IPRs involving the patent. There has been a previously filed and instituted IPR against the parent patent of the '544 Patent, US 9,210,590 (*see Ericsson Inc v. Koninklijke KPN N.V.*, IPR2023-00526), but that patent involves different claims and claim limitations. Therefore, 314(a) and *General Plastics* do not provide a basis to deny the Petition.

C. § 325(d)

The same or substantially the same prior art or arguments were not previously were presented to the Office. Frenger was substantively discussed during the prosecution of the '544 Patent, but the Examiner only considered Frenger in the context of anticipation under §102. The Examiner did not have the benefit of considering Frenger in view of Fischer under § 103. *Oticon Medical AB et al. v. Cochlear Limited*, IPR2019-00975, Paper 15, 9-20 (PTAB Oct. 16, 2019) (precedential) (finding the first prong of the *Advanced Bionics* framework

unsatisfied when the particular combinations set forth in the petition were not considered by the examiner).

Notably, the Examiner concluded that Frenger taught every limitation of claim 1 except:

- “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;
- recognizing that the reporting identifier; and
- 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.

(See EX1002 (Non-Final Office Action), ¶15; EX1002 (Notice of Allowance), ¶12). As explained in Section IX.B above, Hurst clearly teaches these limitations and thus overcomes any purported deficiencies the examiner identified in connection with Frenger. Also explained above, a POSITA would have been motivated to combine the teachings of Frenger and Fischer to achieve the claimed invention with a reasonable expectation of success.

The remaining references (*i.e.*, Fischer, Hurst, Nylander, Kim, or Lin) were not before the Examiner and they are not cumulative of Frenger because Fischer,

Hurst, Nylander, Kim, and Lin teach additional limitations regarding the measurement/reporting parameters, the obtaining and providing of the measurement report, as well as the reporting identifier, which Petitioners rely upon as support for its obviousness disclosure of limitations 1[b], 1[d], and 1[f] through 1[h] as detailed in Sections VIII.D and IX.D above. Thus, no record evidence suggests that the examiner considered any argument or grounds of unpatentability raised in this petition. Accordingly, as explained above, the Board should institute IPR.

XI. MANDATORY NOTICES AND FEES

A. Real Party-In-Interest

The real parties-in-interest for Petitioners are Samsung Electronics America, Inc. and Samsung Electronics Co., Ltd.

B. Related Matters

Petitioners filed a declaratory judgment of non-infringement against the '544 patent in related district court litigation captioned *Samsung Electronics Co. Ltd et al, v. Koninklijke KPN N.V. et al*, 1:24-cv-01433 (D. Del.).

C. Counsel and Service Information

Petitioners provide the following counsel and service information. Petitioners consent to electronic service the email addresses listed in the table below. Pursuant to 37 C.F.R. § 42.10(b), a Power of Attorney accompanies this Petition.

LEAD COUNSEL	BACK-UP COUNSEL
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D. Payment of Fees

The undersigned authorizes the Office to charge the fee required for this Petition for *Inter Partes* Review to Deposit Account No. 50-5708. Any additional fees that might be due are also authorized.

XII. CONCLUSION

For the reasons above, *inter partes* review is requested.

Date: January 25, 2025

Respectfully submitted,

By: /s/ James M. Glass
James M. Glass

Counsel for Petitioners

**CERTIFICATE OF COMPLIANCE WITH
TYPE-VOLUME LIMITATION, TYPEFACE REQUIREMENTS,
AND TYPE STYLE REQUIREMENTS**

1. This Petition complies with the type-volume limitation of 14,000 words, comprising 13,759 words, as counted using the Microsoft Word software that was used to prepare this paper, excluding the parts exempted by 37 C.F.R. § 42.24(a).

2. This Petition complies with the general format requirements of 37 C.F.R. § 42.6(a) and has been prepared using Microsoft® Word 2016 in 14-point Times New Roman.

Date: January 25, 2025

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that on January 27, 2025, true and correct copies of the foregoing document and supporting materials were served in its entirety on the Patent Owner at the following address of record as listed on PAIR via Priority Mail Express® or Express Mail:

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Date: January 25, 2025

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