

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ericsson Inc.

Petitioner

v.

Electronics and Telecommunications Research Institute

Patent Owner

Patent No. 9,155,066

Filing Date: May 13, 2014

Issue Date: October 6, 2015

Title: METHOD FOR PAGING INFORMATION IN CELLULAR SYSTEM

Inter Partes Review No. IPR2019-00252

**PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. § 42.100 *ET SEQ.***

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LIST OF EXHIBITS

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1001	U.S. Patent No. 9,155,066 (“the ’066 patent”)
1002	Prosecution History of U.S. Ser. No. 14/276,511 (application leading to the ’066 patent)
1003	Declaration of Dr. Wayne Stark
1004	Curriculum Vitae of Dr. Wayne Stark
1005	<i>Sol IP, LLC v. AT&T</i> , et al. Mobility Preliminary Constructions on December 4, 2019 (“Court’s Preliminary Constructions”)
1006	Bishop Declaration
1007	“PCH mapping and Paging control” submitted to 3GPP at the March 27-31, 2006 joint meeting of the 3GPP RAN1/RAN2 in Athens, Greece by China Academy of Telecommunications Technology (“CATT”) (“R2-060988”)
1008	“LTE physical-layer models” submitted to 3GPP at the TSG-RAN WG1 #44 in Denver, Colorado on February 13-17, 2006 by Ericsson (“R1-060572”)
1009	“Physical Layer Aspects for Evolved UTRA (Release 7),” Technical Report of 3GPP published in April 2006 (“3 GPP TR 25.814 v1.2.2 (2006-03)”)
1010	“Evolved Paging for LTE” submitted to 3GPP at the 3GPP TSG-RAN WG2 Meeting #51 in Denver, Colorado on February 13-17, 2006 by Philips (“R2-060429”)
1011	“Paging for E-UTRA” submitted to 3GPP at the TSG-RAN WG1 #44 in Denver, Colorado on February 13-17, 2006 by Ericsson (“R1-060576”).
1012	“OFDMA Downlink Physical channel mapping – text proposal” submitted to 3GPP at the 3GPP TSG RAN WG1 LTE Ad Hoc Meeting in Helsinki, Finland on January 23-25, 2006 by Nokia (“R1-060187”)

1013	“3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Physical channels and mapping of transport channels onto physical channels (FDD) (Release 6)” (“3GPP TS 25.211 v6.7.0 (2005-12)”)
1014	3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Radio interface protocol aspects (Release 7)” (“3GPP TR 25.813 v0.8.0 (2006-04)”)
1015	First Amended Complaint for Patent Infringement, Sol IP, LLC v. AT&T Mobility LLC, Case No. 2:18-cv-00526 (E.D. Tex.), filed on March 22, 2019 (Dkt. No. 100) (“Complaint”)

I. PRELIMINARY STATEMENT

Petitioner Ericsson Inc. (“Ericsson”) respectfully requests *inter partes* review and cancellation of claims 10, 11, and 16 of U.S. Patent No. 9,155,066 (“the ’066 Patent”) under 35 U.S.C. §§ 311-319 and 37 C.F.R. § 42.100 *et seq.*

The ’066 Patent relates to the wireless communication between cellular devices and base stations, and in particular, a concept called paging. Patent Owner Electronics and Telecommunications Research Institute, by and through its licensing agent Sol IP, LLC (collectively “Patent Owner”), allege that claims 10, 11, and 16 of the ’066 Patent are essential to LTE Release 8.¹ Ex. 1015, ¶¶ 83-84. However, ETRI did not contribute what it now claims as its invention to the LTE standard. Instead, all of the concepts claimed in the ’066 Patent were developed during the 4G LTE standard-setting process by others, and included in printed publications that were submitted to the standard-setting body and made publically available via an email reflector. Ex. 1006, at ¶¶ 27, 38-85. Shortly thereafter, ETRI filed a patent application on these ideas in South Korea. Ex. 1001.

¹ Petitioner disagrees. Nevertheless, the invalidity analysis herein is based on Patent Owner’s allegation that practicing the LTE Release 8 standard infringes the Challenged Claims.

This Petition, supported by the Declaration of Dr. Wayne Stark, explains why there is a reasonable likelihood that claims 10, 11, and 16 of the '066 Patent are unpatentable as obvious to a person of ordinary skill in the art ("POSITA") in view of the prior art cited herein, the knowledge and understanding of a POSITA, and the '066 Patent itself. Accordingly, claims 10, 11, and 16 of the '066 Patent should be cancelled.

II. IDENTIFICATION OF CHALLENGE AND RELIEF REQUESTED

Ericsson requests review under 35 U.S.C. § 311 of Challenged Claims 10, 11, and 16 of the '066 Patent, and that the Board cancel the same as being unpatentable in view of the cited prior art and the Grounds described below.

Ground 1: Claims 10 and 16 are obvious over R2-060429 in view of R1-060572 (to the extent necessary) and R1-060576.

Ground 2: Claim 11 is obvious over R2-060429 in view of R1-060572 (to the extent necessary), R1-060576, and R1-060187.

Ground 3: Claims 10 and 11 are obvious over R2-060988 in view of R1-060572 and TR 25.814.

Ground 4: Claim 16 is obvious over R2-060988 in view of R1-060572, TR 25.814, and R2-060429 (to the extent necessary).

III. TECHNOLOGICAL BACKGROUND

The technology at issue in this petition was developed by members of the Third Generation Partnership Project (“3GPP”) during the 4G standard setting process. To create the 4G standard, 3GPP held standard setting meetings at which 3GPP members proposed technology to include in the standard. These proposals were typically submitted in documents called “contributions.” The 3GPP members emailed their contributions to a 3GPP email list and posted them to the publicly available 3GPP FTP site before each meeting. Ex. 1006, at ¶¶ 31-37.

A. The ’066 Patent

The ’066 Patent is titled “Method For Paging Information In Cellular System.” Relevant to the Challenged Claims, the ’066 Patent describes methods for transmitting paging information in a packet-based cellular system, such as LTE. Ex. 1001 at 1:21-25; 2:13-16. Paging is a mechanism used in cellular communications that allows a transmitting device, e.g., a base station, to inform a receiving device, e.g., a smartphone (also known as a terminal, or user equipment “UE”) that there is information available. *See* Ex. 1003, ¶ 37. In a typical paging process, a terminal may use a “discontinuous reception process” (also called DRX) to cycle between a low-power idle state and an active state to listen for paging information. *Id.* In DRX, if paging information is received, the terminal will remain in an active state

and initiate a process to obtain the available information. *Id.* The general concept of paging far predates the '066 Patent. *Id.*

The '066 Patent describes the paging process used in the prior art WCDMA method with respect to the concepts of transport channels and physical channels. Ex. 1001 at 1:29-40. Cellular communications typically refer to the concept of “channels” as a way to distinguish and group specific types of information and the way that information is processed. Ex. 1003, ¶ 38. The concept of “transport channels” is used to define *how* data is transmitted over the air, e.g., the encoding and interleaving options used to transmit data. *Id.* The concept of “physical channels” is used to define *where* data is when transmitted over the air, e.g., the first N symbols of a transmission. *Id.*

The WCDMA paging process involved transmitting a paging message and use of a paging indicator channel to notify the terminal that the paging message was transmitted. *Id.*, ¶ 39. The paging message was included in a transport channel called a paging channel (PCH). *Id.* The PCH was mapped into a physical channel called a secondary common control physical channel (S-CCPCH). Ex. 1001 at 1:31-37; Ex. 1003, ¶ 39. A physical channel called a paging indicator channel (PICH) was used to notify UEs that a paging message was sent. Ex. 1001 at 1:43-60; Ex. 1003, ¶ 39. In WCDMA, terminals “monitor the paging indication channel every monitoring cycle . . . [and] when it is sensed that indication information

corresponding to the group including the terminal exists in the paging indication channel, the terminals search PCH information transmitted to the S-CCPCH channel” and decode the paging information. Ex. 1001 at 1:58-2:3; Ex. 1003, ¶ 39.

The '066 Patent characterizes WCDMA as having “a problem that limited radio resource is wasted.” Ex. 1001 at 2:8-12. In WCDMA, the S-CCPCH was “statically operated” and existed regardless of whether a paging message was being sent. Ex. 1001 at 2:8-12, 1:49-52; Ex. 1003, ¶ 40. Because of this static operation, limited radio resources, such as OVSF code index and power, are always allocated regardless of whether a paging message was actually present. *Id.*

The '066 Patent alleges that its invention “improve[s] applicability of a limited radio resource by variably and flexibly setting up and mapping a transport channel and physical channel in a method for transmitting information notifying start of downlink information from a base station to a terminal in a cellular system for packet transmission.” Ex. 1001 at 2:66-3:4.

B. Challenged Claims

This Petition challenges claims 10, 11, and 16 of the '066 Patent. Claims 10, 11, and 16 are reproduced below and emphasized for reference in the following discussion:

10. A method for transmitting paging information, performed in a base station, the method comprising:

when a paging information is generated, allocating the paging information to a downlink shared channel;

allocating an identifier indicating existence of the paging information and a radio resource allocation information indicating radio resource to which the paging information is allocated to a control channel; and

transmitting the control channel and the downlink shared channel to a terminal,

wherein when the paging information is not generated, the identifier is not allocated to the control channel, and

wherein the identifier is used by reserving and allocating a part of scheduling identifiers.

11. The method of claim 10, wherein the control channel and the downlink shared channel are physical channels.

16. The method of claim 10, wherein the terminal is in Radio Resource Control (RRC) Connected state.

As shown above, claim 10 recites a paging method with two primary options.

When paging information is present, paging information is allocated to a “downlink shared channel,” and another “control channel” will include an identifier “indicating existence of the paging information and a radio resource allocation information indicating radio resource to which the paging information is allocated.” Both the “downlink shared channel” and “control channel” are transmitted to a terminal. In contrast, when paging information is not generated, the claim only recites the identifier is not allocated to the “control channel.” Ex. 1001 at 9:6-19.

The '066 Patent describes the general claimed process as follows:

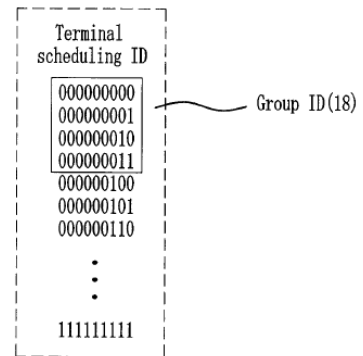
That is, the terminals may recognize whether the paging message on the terminal group exists by searching a control channel and checking existence of the group ID reserved and allocated for transmission of the paging information in the scheduling information of the control channel transmitted from the base station. Therefore, when there is no group ID for the paging message indicating own group in the control channel, the terminals determine that the paging message does not exist, and continuously performs a discontinuous reception operation. When the group ID exists, the terminals stop the discontinuous reception operation and receive the paging message that the base station transmits on the radio resource addressed by the group ID.

Ex. 1001 at 6:57-7:3.

With respect to the “wherein **the identifier** is used **by reserving and allocating a part of scheduling identifiers**” limitation, the ’066 Patent describes a process where a part of the information included in the terminal scheduling identifiers are used as a group ID:

As shown in FIG. 5, the present invention is operated by reserving and allocating a part of the information included in the terminal scheduling ID as a group ID for paging information. The group ID is an ID used by reserving and allocating a part of a scheduling ID (i.e., a cell radio network temporary identifier (C-RNTI))² for uniquely identifying a terminal. A base station may operate by reserving at least one scheduling ID.

FIG. 5



Ex. 1001 at 6:3-10 (emphasis added).

C. Prosecution History

The '066 Patent application was filed on May 13, 2014. During prosecution, the United States Patent and Trademark Office issued a non-final office action on August 1, 2014 and a final office action on March 3, 2015. A Notice of Allowance was issued on June 5, 2015.

August 1, 2014 Office Action:

² A “C-RNTI” is a concept used in WCDMA and LTE to refer to a “Cell Radio Network Temporary Identifier.” Ex. 1003, ¶ 43. In WCDMA and LTE, C-RNTI’s were IDs used to identify a terminal participating in a cell area. *Id.*

In the August 1, 2014 office action, the Examiner rejected pending claim 1 as anticipated by 3GPP RAN1/RAN2 joint meeting on LTE, R2-060988 (“R2-060988”). Ex. 1002 at 58.

In response, the Applicant amended the claims and argued that R2-060988 “neither discloses nor suggests the limitations of amended claim 1, for example, detecting an identifier indicating existence of a paging information and when the paging information does not exist in the downlink shared channel, the identifier is not detected.” *Id.* at 96. According to the Applicant, R2-060988 disclosed that the paging indicator is always allocated to radio resources, i.e., “the paging indicator is allocated to the radio resources if there is the paging information as well as if there is no the paging information.” *Id.* at 97. In contrast, the Applicant argued that in the present invention, the identifier is flexibly allocated to the radio resources such that “the identifier is allocated to the radio resources if there is the paging information. However, the identifier is not allocated to the radio resources if there is no the paging information.” *Id.* The Applicant also argued that in the present invention, the UE received the paging information through two steps, whereas R2-060988 disclosed a UE receiving the paging information in a three step procedure. Ex. 1002 at 98. The Applicant described the alleged three steps of receiving paging information disclosed in R2-060988 as “[i]n first step, UE decodes the PI-ID to identify existence of the paging information. In second step, UE decodes the paging

indicator if there is the paging information. In third step, UE receives the paging information based on resource allocation information.” *Id.* In contrast, for the present invention, the Applicant argued that “UE detects the identifier in the first step, and UE receives the paging information based on the resource allocation information if the identifier is detected in the second step.” *Id.*

March 3, 2015 Office Action:

In the March 3, 2015 office action, the Examiner issued a final rejection and found the Applicant’s arguments to be moot because of a new ground of rejection based on the same R2-060988 reference as before. However, the Examiner offered some clarifying remarks regarding the Applicant’s arguments. The Examiner found that the scope and content of amended claim 1 only indicated that “the paging identifier is detected when there is paging information and the paging indicator is not detected when there is no paging information.” Ex. 1002 at 107. The Applicant’s focus on the paging identifier being flexibly allocated and the radio resource is allocated for the paging indicator based on the existence of paging information were not found in the current scope of the claim. *Id.* Further, R2-060988’s disclosure that “UE listening to paging indicator in DRX mode and monitor if the paging indicator match with the ID of the mobile device which indicate that there is existence of paging information for the mobile device, and

proceed further by reading resource allocation of paging channel PCH and read PCH data” addressed the current scope of claim 1. *Id.*

Regarding the Applicant’s argument about the claimed invention’s two-step procedure, the Examiner found that to be inaccurate and that there was actually a three step procedure to detect the paging information. Ex. 1002 at 107. Accordingly, “the current claimed procedure is similar to the teaching presented in Fig. 2 of 3GPP teaching.” *Id.* at 107-108. The Examiner also rejected pending claims 11 and 12 (which issued as presently challenged claims 10 and 11, respectively) as anticipated by R2-060988. *Id.* at 121-122. For pending claim 18 (which issued as presently challenged claim 16), the Examiner rejected the claim as obvious over R2-060988 in view of US 20050192021 A1 to Lee et al. (“Lee”). The examiner found that “Lee discloses wherein the terminal is in Radio Resource Control (RRC)_Connected state or RRC_idle state (0022 discloses mobile terminal is in RRC idle or connected mode).” *Id.* at 125.

The Applicant responded by amending pending claim 11 to incorporate the limitation of pending claim 13. Ex. 1002 at 158. The Applicant also argued that R2-060988 failed to disclose the limitation “‘wherein when the paging information does not exist in the downlink shared channel, the identifier is not detected, *and the identifier is not allocated to the control channel,*’ (emphasis added) as recited in independent claim 1 and similarly recited in independent claim 11.” Ex. 1002 at

162. The Applicant argued that because R2-060988 disclosed “the paging indicating channel to which the paging indicator is allocated indicates whether having PCH,” that showed that “the paging indicator is always allocated to radio resources,” and thus, “the paging indicator is allocated to the radio resources if there is the paging information as well as if there is no the paging information.” *Id.* (emphasis in original). The Applicant argued that this taught away from the identifier of the claimed invention. *Id.* at 163.

Further, the Applicant argued that the PI-ID of R2-060988 likewise taught away from the identifier of the claimed invention. The Applicant argued that because R2-060988 disclosed “the PI-ID is identical to the UE-ID if there is the paging information” and the “PI-ID is not identical to the UE-ID if there is no the paging information,” that showed that “the PI-ID is always allocated to radio resources.” Ex. 1002 at 164. In contrast, the claimed invention required that “the identifier is not allocated to the radio resources if there is no the paging information.” *Id.* (emphasis in original).

Furthermore, the Applicant argued that R2-060988 did not disclose amended claim 11’s limitation ““wherein the identifier is used by reserving and allocating a part of scheduling identifiers,’ (emphasis added).” Ex. 1002 at 164. The Applicant argued that the Office Action alleged that the PI-ID is the scheduling identifier which is reserved temporarily to UE. But because R2-060988 disclosed that “the PI-ID

equals to C-RNTI in size and is used in place of C-RNTI,” the Applicant argued that “the PI-ID is not used by reserving and allocating a part of scheduling identifiers, but rather replaces C-RNTI.” *Id.* According to the Applicant, this is in contrast to the operation of the claimed invention, as shown in Fig. 5.

[T]he present invention is operated by reserving and allocating a part of the information included in the terminal scheduling ID as a group ID for paging information. The group ID is an ID used by reserving and allocating a part of a scheduling ID (i.e., a cell radio network temporary identifier (C-RNTI)) for uniquely identifying a terminal. A base station may operate by reserving at least one scheduling ID.

Id. Thus, R2-060988 failed to disclose all the features recited in claim 11. Pending claims 12 and 18 were argued to be allowable based on their dependencies from allowable claim 11.

On June 5, 2015, the Examiner issued a Notice of Allowance (“NOA”). The NOA characterized R2-060988 as follows:

3GPP RAN1/RAN2 joint meeting on LTE R2-060988, “PCH mapping and paging control” (“3GPP_1” hereinafter) discloses details about using PI-CH indicator for indicating an existing of a paging indicator. When PI-CH exists, mobile device read the paging indicator to determine if paging information exists for the mobile

device (**section 2-3**). Therefore, the reference is silent on details about **(1)** using identifier transmitted through the control channel for indicating existence of paging information wherein the identifier is used by reserving and allocating a part of scheduling identifier.

Ex. 1002 at 186 (emphasis in original).

D. Claimed Priority Date

Application No. 14/276,511, which issued as the '066 Patent, was filed on May 13, 2014, is a continuation of Application No. 12/298,227 filed on April 24, 2007, now U.S. Patent No. 8,761,814, and claims priority to two foreign Korean applications filed on April 26, 2006 and April 20, 2007, respectively. For the purposes of this Petition, April 26, 2006 is presumed as the priority date of the challenged claims.

IV. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art would have (i) an undergraduate degree in Electrical Engineering, Computer Science, or Computer Engineering, or a related field, and around two years of experience in the theory, design, and/or development of cellular technology, or a person with a master's degree in one of the foregoing with a focus on cellular networks, or (ii) a Master's degree in one of the foregoing fields with a focus on cellular technology. *See* Ex. 1003, ¶ 64. Someone with less or different technical education but more relevant practical experience, or more

relevant education but less practical experience, could also be considered a POSITA. *Id.*

V. CLAIM CONSTRUCTION

Claim construction in *inter partes* review is governed by the same standard as it would be in a district court. 37 C.F.R. § 42.100(b). Terms should be interpreted in view of “their ordinary and accustomed meaning as understood by one of ordinary skill in the art.” *Dow Chem. Co. v. Sumitomo Chem. Co.*, 257 F.3d 1364, 1372 (Fed. Cir. 2001); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005) (en banc). “The construction that stays true to the claim language and most naturally aligns with the patent’s description of the invention will be, in the end, the correct construction.” *Phillips*, 415 F.3d at 1316.

In the Related Litigations, the parties disagree on the construction of four terms with respect to the claims at issue in the present IPR Petition. A claim construction order has not issued at the time of the present IPR Petition, but the Court in the Related Litigations issued Preliminary Constructions for these terms on December 4, 2019. Ex. 1005 at 1. The parties’ positions and the Court’s preliminary constructions are set forth below. For the purpose of this IPR Petition, Petitioner asserts that Court’s preliminary construction for the “wherein ... the downlink shared channel are physical channels” is adopted. The Board does not need to construe the disputed terms because, as shown herein, the prior art encompasses both sides’

proposed constructions for these terms, as well as the Court's Preliminary Constructions.

Claim Term	Sol IP's Construction	Defendants' Construction	Court's Preliminary Construction
“downlink shared channel”	Plain and ordinary meaning. Alternatively, “shared channel used for downlink.”	“DL-SCH, a downlink transport channel for user data transmission”	“shared channel used for downlink”
“scheduling identifiers”	Plain and ordinary meaning. Alternatively, “scheduling identifier” means “identifier of a specific terminal or terminal group.” “Scheduling identifiers” is the plural.	“cell radio network temporary identifiers (C-RNTIs)”	“identifiers that identify specific terminals or terminal groups and that are used for scheduling”
“the identifier is used by reserving and allocating a part of scheduling identifiers”	Plain and ordinary meaning. Alternatively, “the identifier is a reserved and allocated part of the scheduling identifiers.”	“the identifier is used by reserving and allocating a part of the information included in the terminal [scheduling identifier] as a group identifier for paging information”	Plain meaning apart from the Court's construction of “scheduling identifiers”
“wherein ... the downlink shared channel are physical channels”	Plain and ordinary meaning, with “downlink shared channel” construed as proposed above.	Indefinite	Plain meaning apart from the Court's construction of “downlink shared channel”

VI. PRIOR ART

As evidenced by the prior art and explained by Dr. Stark in the attached expert declaration (Ex. 1003), the claimed paging methods were well known before the '066 Patent's priority date. Ex. 1003, ¶ 69. In addition to the extensive background knowledge that a POSITA³ would have brought to bear on the subject matter discussed in the '066 Patent, the following prior art demonstrates that the challenged claims would have been obvious.

A. R2-060429

“Evolved Paging for LTE” is a written contribution submitted to 3GPP at the 3GPP TSG-RAN WG2 Meeting #51 in Denver, Colorado on February 13-17, 2006 by Philips (“R2-060429”). The document is a submission to the 3GPP standards body for consideration in developing the LTE cellular system. Ex. 1006, at ¶¶ 70-77. R2-060429 is a printed publication prior art reference under at least 35 U.S.C. 102(a) as it was accessible and available via 3GPP's publicly available website on February 9, 2006 before the '066 Patent's priority date of April 26, 2006. *Id.* R2-060429 was not considered during prosecution of the '066 Patent application.

R2-060429 discloses an evolved paging procedure for LTE for how to use the paging channel (PCH) as a transport channel. R2-060429 discloses a “Text

³ See, e.g., Ex. 1003, ¶¶ 28-35.

Proposal” for TR 25.813⁴ with redlines to the paging section 5.2.2’s description of a paging channel PCH. Ex. 1010 at 4.

R2-060429 discloses that the 3GPP group “decided that the [paging channel] PCH will be a separate transport channel from the Downlink Shared Channel (DL-SCH), while being mapped to physical resources that can be shared with other traffic or control channels such as the DL-SCH.” *Id.* at 1. In light of that decision, R2-060429 proposes that “the [paging channel] PCH carries broadcast data of Paging Information.” *Id.* at 2. R2-060429 also discloses that “[t]he PCH is configured to carry Paging Information that is monitored in either continuous mode or in DRX mode depending on the LTE RRC and/or LTE-MAC state of the UE.” *Id.* at 2 (Proposal 1). R2-060429 discloses “a series of proposals for the Paging Channel in the E-UTRAN, with the aim to provide flexible configurations and faster initial cell access.” Ex. 1010 at 3.

B. R1-060572

“LTE physical-layer models” is a written contribution submitted to 3GPP at the TSG-RAN WG1 #44 in Denver, Colorado on February 13-17, 2006 by Ericsson

⁴ Evolved Universal Terrestrial Radio Access (UTRA) and Universal Terrestrial Radio Access Network (UTRAN); Radio interface protocol aspects (Release 7), V0.3.0, 2006-01

(“R1-060572”). The document is a submission to the 3GPP standards body for consideration in developing the LTE cellular system. Ex. 1006, at ¶¶ 54-61. R1-060572 is a printed publication prior art reference under at least 35 U.S.C. 102(a) as it was accessible and available via 3GPP’s publicly available website on February 9, 2006 before the ’066 Patent’s priority date of April 26, 2006. *Id.* R1-060572 was not considered during prosecution of the ’066 Patent application.

R1-060572 discloses “some aspects of the services provided by the LTE physical layer to higher layers, primarily Layer 2.” Ex. 1008 at 1. Specifically, R1-060572 outlines proposals for physical-layer models of E-UTRA DL-SCH and UL-SCH, i.e., how the layer two transport shared channels (DL-SCH and UL-SCH) access physical layer radio resources and select resource and transport blocks for transmission. Ex. 1008 at 1, 3, 4. Ex. 1003, ¶ 75. As it relates to paging procedures for LTE, R1-060572 discloses that “[f]rom a Layer 1 point-of-view, paging messages (‘PCCH’) and system information (‘BCCH’) can be transmitted in the same way as data being transmitted using the DL-SCH or, more exactly, the physical-layer characteristics of transfer of paging messages and system information can be assumed to be a sub-set of the possible physical-layer characteristics of DL-SCH transmission.” Ex. 1008 at 2. Thus, R1-060572 discloses that rather than defining a specific transport-channel type PCH (paging channel) for transmission of paging messages, paging messages should be transmitted using the DL-SCH. Ex.

1008 at 2. Ex. 1003, ¶ 75. Such a design without “defin[ing] specific BCH and PCH transport-channel types would obviously lead to a simplified transport-channel structure.” R1-060752.

C. R1-060576

“Paging for E-UTRA” is a written contribution submitted to 3GPP at the TSG-RAN WG1 #44 in Denver, Colorado on February 13-17, 2006 by Ericsson (“R1-060576”). The document is a submission to the 3GPP standards body for consideration in developing the LTE cellular system. Ex. 1006, at ¶¶ 62-69. R1-060576 is a printed publication prior art reference under at least 35 U.S.C. 102(a) as it was accessible and available via 3GPP’s publicly available website on February 9, 2006 before the ’066 Patent’s priority date of April 26, 2006. *Id.* R1-060576 was not considered during prosecution of the ’066 Patent application.

R1-060576 discloses a proposal for an “efficient paging procedure” and contrasts the proposal with the prior method of WCDMA. Ex. 1011 at 1. WCDMA used a specific channel, a separate paging indicator channel, to signal to a UE to receive paging information. *Id.* In contrast, R1-060576 proposed that, for LTE, “paging can rely on the shared control channel, monitored at predefined time instants (DRX cycle, configured by higher layers).” *Id.* The shared control channel is “the part of the subframe carrying control information for operation of downlink scheduling, similar to the HS-SCCH in HSDPA.” *Id.* at fn. 1. By relying on the

shared control channel to serve the purpose of a paging indicator, a paging indicator channel is no longer needed, providing potential power savings. *Id.* at 1. Also, “[r]elying on the shared control channel for paging avoids having to introduce specific L1 structures. Instead, paging relies on already existing L1 structures and can be seen as scheduling implementation.” *Id.*

R1-060576 describes the paging procedure as follows: “[i]f the UE detects scheduling control information, through the presence of its own identity or a common paging group identity, the data part of the downlink transmission is received and further processed by higher layers. Otherwise, the UE reverts to sleeping until the next paging occasion.” Ex. 1011 at 1. This paging procedure is reflected in Figure 1, shown below. Control signaling may be used to indicate that paging information is present. Ex. 1003, ¶ 78. Further, as disclosed in R1-060576, the control signaling may contain a single UE’s own identity or a common paging group identity. Ex. 1011 at 1.

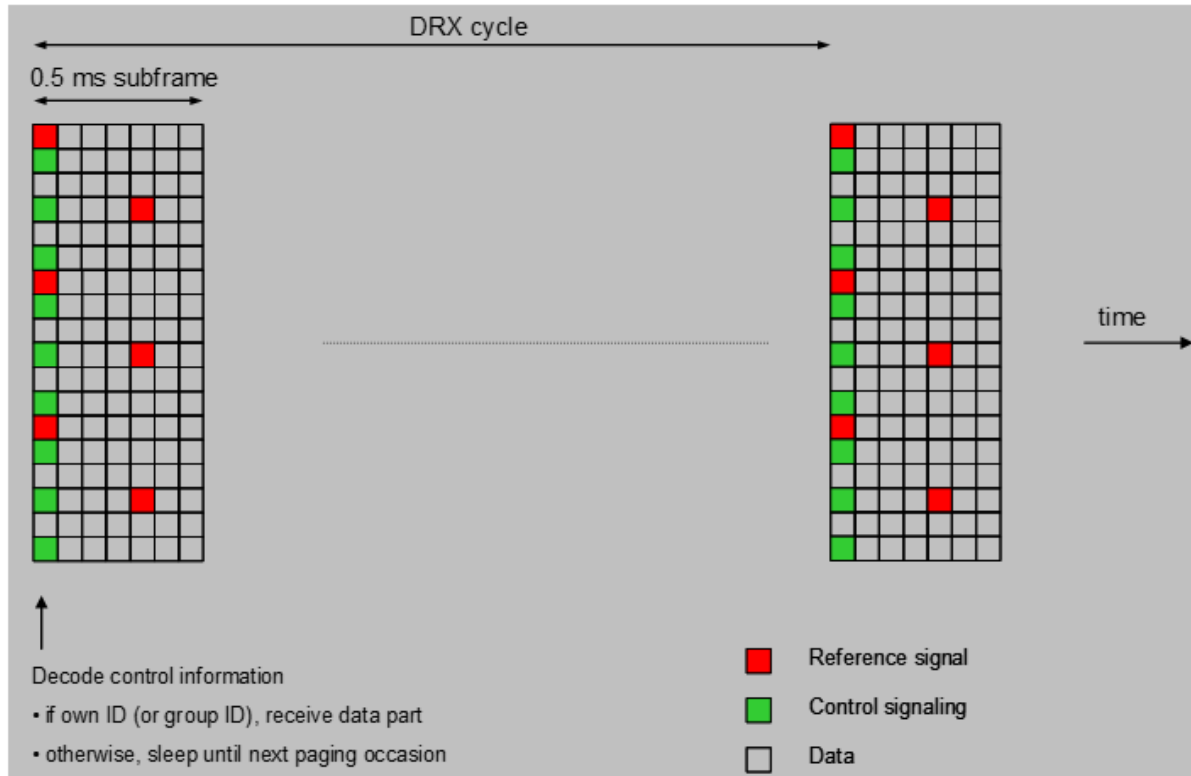


Figure 1: Schematic illustration of the paging mechanism (the amount of reference signals, location of control information, etc is not to scale).

Ex. 1011 at Figure 1.

D. R1-060187

“OFDMA Downlink Physical channel mapping – text proposal” is a written contribution submitted to 3GPP at the 3GPP TSG RAN WG1 LTE Ad Hoc Meeting in Helsinki, Finland on January 23-25, 2006 by Nokia (“R1-060187”). The document is a submission to the 3GPP standards body for consideration in developing the LTE cellular system. Ex. 1006, at ¶¶ 46-53. R1-060187 is a printed publication prior art reference under at least 35 U.S.C. 102(a) as it was accessible and available via 3GPP’s publicly available website on January 19, 2006 before the

'066 Patent's priority date of April 26, 2006. *Id.* R1-060187 was not considered during prosecution of the '066 Patent application.

R1-060187 "is a text proposal for mapping from [downlink] DL Transport Channels to Physical Channel for E-UTRA similar to the figure found for WCDMA in TS 25.211." Ex. 1012 at 1. R1-060187 discloses a channel called the "Paging Indicator Channel (PCH)," which "is carried with other L1/L2 control information on PDSCCH." *Id.* A POSITA would have understood the Paging Indicator Channel to be referring to the PICH, e.g., as used in WCDMA, not the paging channel (PCH), which is shown in R1-060187 as mapped to the Physical Downlink Shared Channel (PDSCH) and not the Physical Downlink Shared Control Channel (PDSCCH). Ex. 1003, ¶ 80. Figure xy in R1-060187, shown below, summarizes the proposed mapping of transport channels onto physical channels.

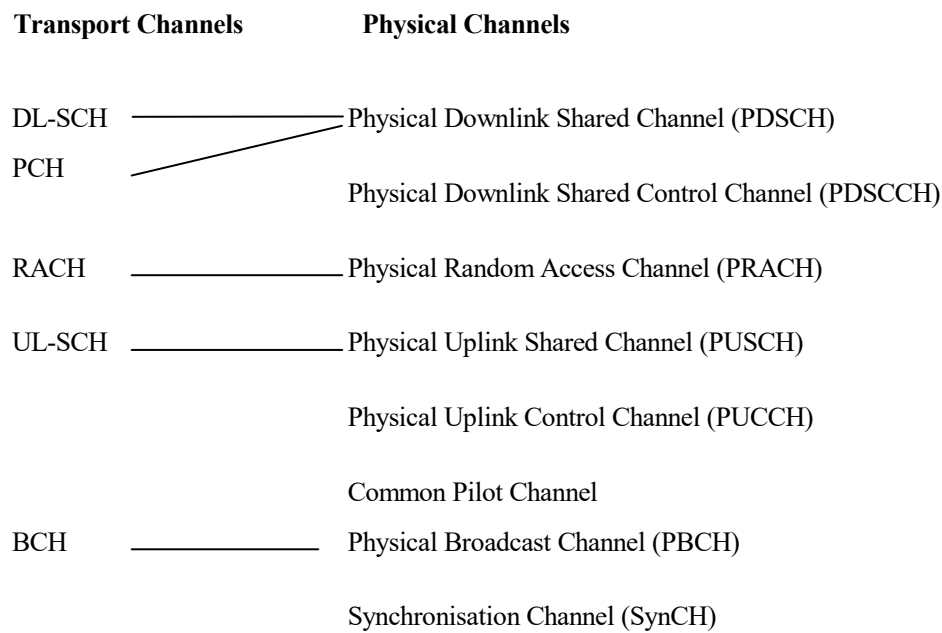


Figure xy: Transport-channel to physical-channel mapping

Ex. 1012 at Figure xy. As shown in Figure xy, the DL-SCH and PCH transport channels are shown to be mapped to the same Physical Downlink Shared Channel (PDSCH).

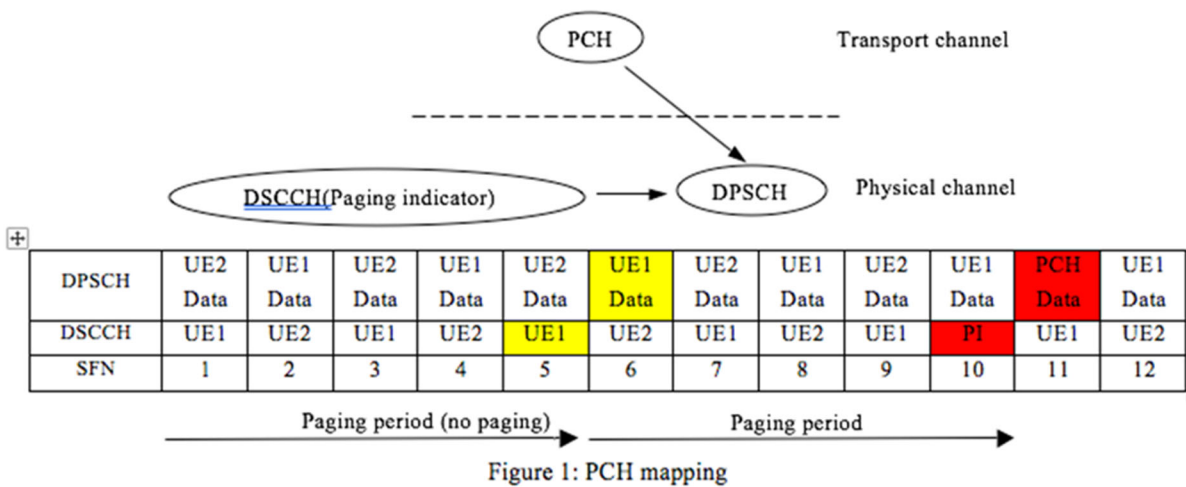
E. R2-060988

R2-060988 is a written contribution titled “PCH mapping and Paging control” and submitted to the 3rd Generation Partnership Project (“3GPP”) standards organization at the March 27-31, 2006, joint meeting of the 3GPP RAN1/RAN2 in Athens, Greece by China Academy of Telecommunications Technology (“CATT”) (“R2-060988”). The document is a submission to the 3GPP standards body for consideration in developing the LTE cellular system. Ex. 1006, at ¶¶ 78-85. R2-060988 is a printed publication prior art reference under at least 35 U.S.C. 102(a) as it was accessible and available via 3GPP’s publicly available website on March 24, 2006 before the ’066 Patent’s priority date of April 26, 2006. *Id.* R2-060988 was cited during prosecution of the ’066 Patent, and the patentee made no effort to swear behind it. While R2-060988 was considered during prosecution of the ’066 Patent application, the specific combination discussed herein was not considered.

R2-060988 discloses PCH mapping and Paging control procedures for LTE. Ex. 1007 at Title; Ex. 1003, ¶ 82. The reference discloses mapping a paging channel “PCH . . . on the downlink physical shared channel” and combining a “paging

indicator channel . . . with [the] downlink shared control channel.” Ex. 1007 at 1. The PCH is a “transport channel” (*Id.* at 1) and the downlink physical shared channel (also referred to as a DPSCCH) and the paging indicator combined with the downlink shared control channel (also referred to as a DSCCH) are physical channels (*Id.* at 1-2). When there is “no paging” information present, “the DPSCCH doesn’t carry any content of PCH to save the radio resource.” *Id.* at 1.

This paging process is generally illustrated by R2-060988’s Figure 1, shown below.



Ex. 1007 at Figure 1 (annotated in original). The two physical channels, DSCCH and DPSCCH, are shown in the figure. The DPSCCH is a downlink physical shared channel shared between users (i.e., dynamically allocated), and the DSCCH is a downlink shared control channel. Ex. 1003, ¶ 83. There is also a PCH transport

channel. The process is depicted with respect to system frame numbers (SFNs) dividing up the paging period.

With further reference to Figure 1 shown above, the information on the DSCCH for each SFN is either (i) scheduling information for a specific terminal (labeled in Fig. 1 as “UE1” or “UE2”) or (ii) a paging indicator (labeled in Fig. 1 as “PI”). *Id.* If in a period of “no paging,” the DSCCH will carry a C-RNTI that is specific to a terminal, and data for that terminal will be included in the DPSCH during the next SFN—for example, figure 1 depicts that SFN#5 has a DSCCH that includes the C-RNTI for UE1 while SFN#6 has a DPSCH that includes the data for UE1. Ex. 1003, ¶ 84. If in a period of “paging,” the DSCCH will carry a paging indicator, and the paging channel including the paging message will be included in the DPSCH during the next SFN—for example, figure 1 depicts that SFN#10 has a DSCCH that includes the paging indicator PI while SFN#11 has a DPSCH that includes the paging channel PCH. Ex. 1003, ¶ 84.

R2-060988 describes two proposed “solutions . . . for distinguishing the paging indicator and scheduling information on DSCCH.” In the first solution, the DSCCH will either include a C-RNTI (when no paging information is present) or a PI-ID (when paging information is present on the DPSCH). Ex. 1007 at 2-3; Ex. 1003, ¶ 85. The “PI-ID equals to C-RNTI in size.” Ex. 1007 at 2. In the second solution, the DSCCH will include a “paging tag.” Ex. 1007 at 2. A paging tag value

of “1” indicates that paging information is present on the DPSCH; a paging tag value of “0” indicates that paging information is not present.

The flow of the PI-ID solution is generally illustrated by the flowchart included in R2-060988’s Figure 2 (copied below).

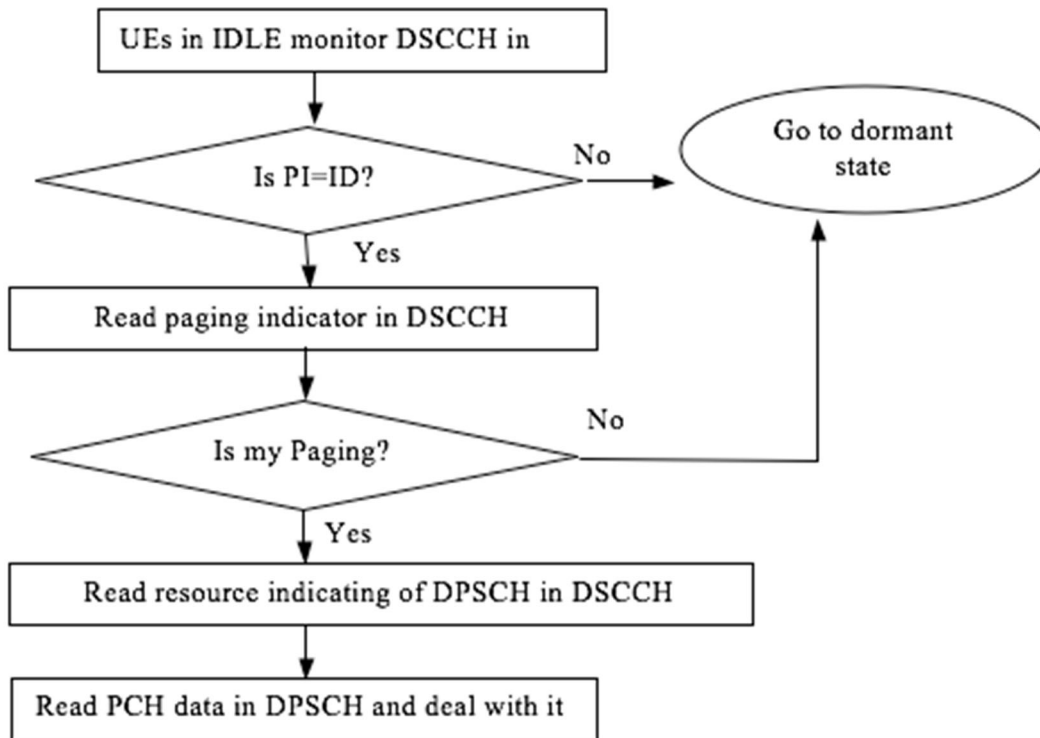


Figure 2: The control procedure of Idle UE

Ex. 1007 at Figure 2. As shown, an idle UE will periodically wake to monitor the DSCCH. If the UE detects a PI-ID in the DSCCH, “the content carried on DSCCH is a paging indicator” (Ex. 1007 at 2), and the UE will “[r]ead paging indicator in DSCCH” (Figure 2). After the UE detects a PI-ID, it will decide if the paging information is for the UE. See Ex. 1007 at Figure 2 (“Is my Paging?”). If so, the UE will read the DSCCH information indicating where the PCH is in the DPSCH

(labeled in Figure 2 as “[r]ead resource indicating of DPSCH in DSCCH) and then read “PCH data in DPSCH and deal with it.” Ex. 1007 at Figure 2; Ex. 1003, ¶ 86. A similar flowchart is included for the “paging tag” solution. *See* Ex. 1007 at Figure 3.

F. TR 25.814

3GPP TR 25.814 V1.2.2 (2006-03), titled “Physical Layer Aspects for Evolved UTRA (Release 7),” is a Technical Report of 3GPP (“TR 25.814”). The document is a draft technical specification endorsed by 3GPP. Ex. 1006, at ¶¶ 38-45. TR 25.814 describes its goal “to help TSG RAN WG1 to define and describe the potential physical layer evolution under consideration and compare the benefits of each evolution techniques, along with the complexity evaluation of each technique.” Ex. 1009 at 8. The “evolution under consideration” resulted in the LTE cellular system. *Id.* TR 25.814 is a printed publication prior art reference under at least 35 U.S.C. 102(a) as it was accessible and available via 3GPP’s publicly available website on April 4, 2006 before the ’066 Patent’s priority date of April 26, 2006. *Id.* TR 25.814 was not considered during prosecution of the ’066 Patent application.

TR 25.814 at § 7 focuses on downlink concepts for paging information. The document describes that a “PICH: Paging Indicator Channel if S-CCPCH carrying the PCH is transmitted over a single carrier.” Ex. 1009 at 45; Ex. 1003, ¶ 88. In TR

25.814, Table 7.1.1.2.3.1-1 shows the different downlink scheduling information required by a UE for downlink transmission. Ex. 1009 at 26 (§ 7.1.1.2.3.1). The document discloses that the scheduling ID Field may identify a specific UE identity or a group of UEs. *Id.* at Table 7.1.2.3.1-1; *see also* Ex. 1003, ¶ 88.

Table 7.1.1.2.3.1-1 Downlink scheduling information required by a UE

	<u>Field</u>		<u>Size</u>	<u>Comment</u>
<u>Cat. 1</u> (Resource indication)	<u>ID (UE or group specific)</u>		<u>8-9</u>	<u>Indicates the UE (or group of UEs) for which the data transmission is intended</u>
	<u>Resource assignment</u>		<u>FFS</u>	<u>Indicates which (virtual) resource units (and layers in case of multi-layer transmission) the UE(s) shall demodulate.</u>
	<u>Duration of assignment</u>		<u>2-3</u>	<u>The duration for which the assignment is valid, could also be used to control the TTI or persistent scheduling.</u>
<u>Cat. 2</u> (transport format)	<u>Multi-antenna related information</u>		<u>FFS</u>	<u>Content depends on the MIMO/beamforming schemes selected.</u>
	<u>Modulation scheme</u>		<u>2</u>	<u>QPSK, 16QAM, 64QAM. In case of multi-layer transmission, multiple instances may be required.</u>
	<u>Payload size</u>		<u>6</u>	<u>Interpretation could depend on e.g. modulation scheme and the number of assigned resource units (c.f. HSDPA). In case of multi-layer transmission, multiple instances may be required.</u>
<u>Cat. 3</u> (HARQ)	<u>If asynchronous hybrid ARQ is adopted</u>	<u>Hybrid ARQ process number</u>	<u>3</u>	<u>Indicates the hybrid ARQ process the current transmission is addressing.</u>
		<u>Redundancy version</u>	<u>2</u>	<u>To support incremental redundancy.</u>
		<u>New data indicator</u>	<u>1</u>	<u>To handle soft buffer clearing.</u>
	<u>If synchronous hybrid ARQ is adopted</u>	<u>Retransmission sequence number</u>	<u>2</u>	<u>Used to derive redundancy version (to support incremental redundancy) and 'new data indicator' (to handle soft buffer clearing).</u>

Ex. 1009 at Table 7.1.1.2.3.1-1 (annotated).

VII. CLAIMS 10, 11, and 16 ARE UNPATENTABLE

Patent Owner sued Ericsson's customers in the Eastern District of Texas and alleged infringement of the Challenged Claims based on their compliance with the

publicly available LTE standard. Ex. 1015, ¶¶ 83-84. As demonstrated below and in the declaration of Dr. Stark, Ericsson believes that it is useful for the Board to see Patent Owner's infringement contentions to further understand how ETRI is interpreting the challenged claims in litigation. However, Patent Owner has marked the contentions confidential. Ericsson intends to request production of these contentions should the Board institute.

A. Ground 1: Claims 10 and 16 are Obvious Under 35 U.S.C. § 103(a) Over R2-060429 in View of R1-060572 (to the extent necessary) and R1-060576

1. Claim 10: [10.pre] “A method for transmitting paging information, performed in a base station, the method comprising:”

To the extent the preamble is limiting, a POSITA would understand that R2-060429 discloses it. Ex. 1003, ¶ 91. R2-060429 discloses “a series of proposals for the Paging Channel in the E-UTRAN, with the aim to provide flexible configurations and faster initial cell access.” Ex. 1010 at 3. The paging channel (“PCH”) “carries broadcast data of Paging Information, and [] the UE listens to the PCH in either continuous or DRX mode depending on their state for power-saving purposes.” Ex. 1010 at 2. R2-060429 further discloses that “a UE would listen to the Paging Information in the follow way: - In LTE RRC Active mode, a UE may monitor the PCH in continuous mode or in DRX mode (in LTE-MAC level) - In LTE Idle mode, a UE may monitor the PCH in DRX mode.” Ex. 1010 at 2. A POSITA would have

understood that R2-060429 discloses a base station broadcasting, i.e., transmitting, paging information to UEs in a cellular system. Ex. 1003, ¶ 91.

2. [10.2] “when a paging information is generated, allocating the paging information to a downlink shared channel;”

A POSITA would have understood R2-060429 to teach this limitation. Ex. 1003, ¶¶ 92-93. R2-060429 discloses “when a paging information is generated, allocating the paging information to a downlink shared channel.” R2-060429 discloses proposals “relating to the Paging Channel in [1] in order to extend the model for the Paging Channel in the E-UTRAN.” Ex. 1010 at 1. The “Paging Channel (PCH) [is] characterised by: . . . requirement to be broadcast in the entire coverage area of the cell.” Ex. 1010 at 1. Moreover, R2-060429 discloses that “the PCH carries broadcast data of Paging Information, and that the UE listens to the PCH in either continuous or DRX mode depending on their state for power-saving purposes.” Ex. 1010 at 1. A POSITA would have understood that broadcasting of the PCH carrying paging information requires paging information to be generated first. Ex. 1003, ¶ 92.

Moreover, R2-060429 discloses that “[i]n our original proposals [3, 4] we advocated the merging of the PCH together with the DL-SCH as transport channels for a simplification of the number of transport channels.” Ex. 1010 at 1. Thus, a POSITA would have understood that the paging information could be allocated to a

downlink shared channel under either side's proposed construction for "downlink shared channel." Ex. 1003, ¶ 93.

To the extent R2-060429 is found not to does not disclose "allocating the paging information to a downlink shared channel," R2-060429 in view of R1-060572 would have rendered this limitation obvious under either side's proposed construction for "downlink shared channel." R1-060572 discloses that "paging messages ('PCCH') and system information ('BCCH') can be transmitted in the same way as data being transmitted using the DL-SCH or, more exactly, the physical-layer characteristics of transfer of paging messages and system information can be assumed to be a sub-set of the possible physical-layer characteristics of DL-SCH transmission." Ex. 1008 at 2; *see also* Ex. 1003, ¶ 94.

3. [10.3] "allocating an identifier indicating existence of the paging information and a radio resource allocation information indicating radio resource to which the paging information is allocated to a control channel; and"

A POSITA would have understood R2-060429 in view of R1-060576 to teach this limitation. Ex. 1003, ¶¶ 95-96. R1-060576 discloses the use of a shared control channel, which is "the part of the subframe carrying control information for operation of downlink scheduling, similar to the HS-SCCH in HSDPA." Ex. 1011 at fn. 1. R1-060576 further discloses that the shared control channel shown in Figure 1 below "serves the purpose of a paging indicator. If the UE detects scheduling control information, through the presence of its own identity or a common paging

group identity, the data part of the downlink transmission is received and further processed by higher layers. Otherwise, the UE reverts to sleeping until the next paging occasion.” Ex. 1011 at 1. A POSITA would have understood that only when there is existence of paging information is the scheduling control information, i.e., the identifier, allocated to a control channel. Ex. 1003, ¶ 95. A POSITA would have understood that if the UE reverts to sleeping, then an identifier has not been allocated to indicate the existence of the paging information. *Id.*

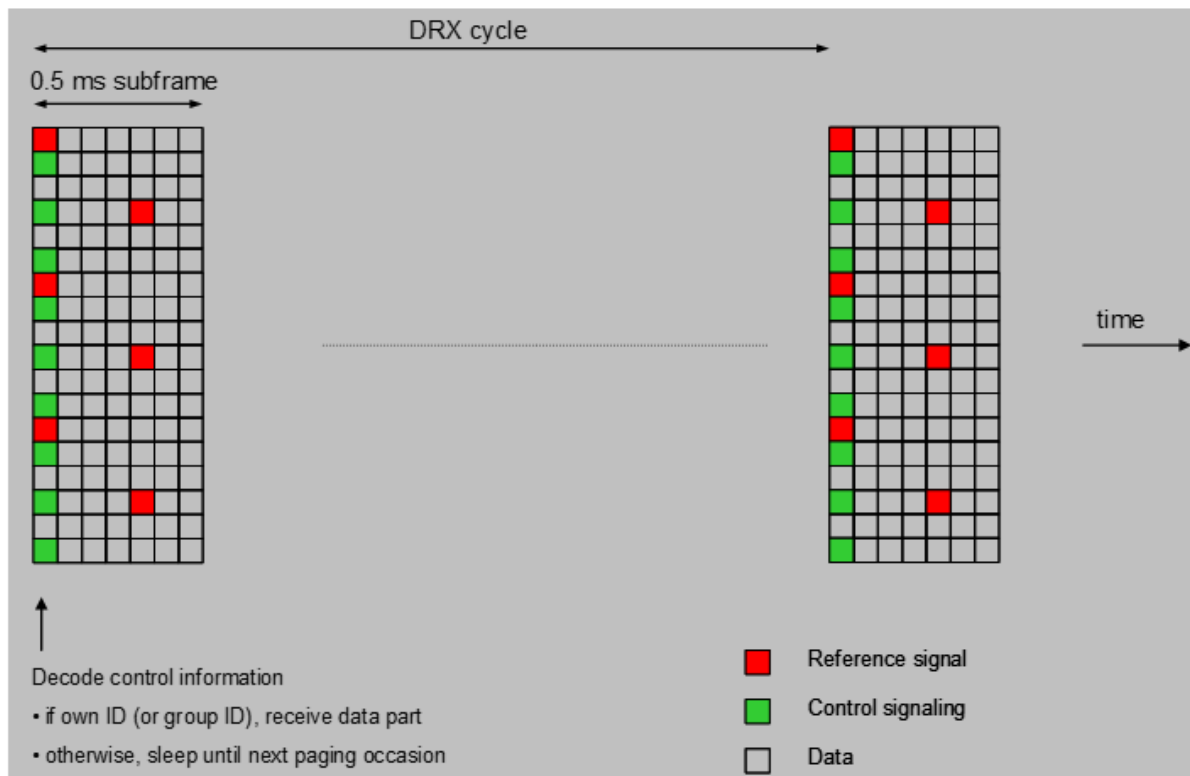


Figure 1: Schematic illustration of the paging mechanism (the amount of reference signals, location of control information, etc is not to scale).

Ex. 1011 at Figure 1.

Furthermore, as disclosed in R1-060576, the control channel includes radio resource allocation information indicating the radio resource to which the paging

information is allocated, since “[i]f the UE detects scheduling control information . . . the data part of the downlink transmission is received and further processed by higher layers.” Ex. 1011 at 1. Ex. 1003, ¶ 96.

4. [10.4] “transmitting the control channel and the downlink shared channel to a terminal,”

A POSITA would have understood R2-060429 in view of R1-060576 to teach this limitation. Ex. 1003, ¶¶ 97-98. As discussed above, R2-060429 discloses that the “Paging Channel (PCH) [is] characterised by: . . . requirement to be broadcast in the entire coverage area of the cell.” Ex. 1010 at 1. R2-060429 further discloses that “the PCH carries broadcast data of Paging Information, and that the UE listens to the PCH in either continuous or DRX mode depending on their state for power-saving purposes.” Ex. 1010 at 1. Moreover, R2-060429 discloses that “[i]n our original proposals [3, 4] we advocated the merging of the PCH together with the DL-SCH as transport channels for a simplification of the number of transport channels.” Ex. 1010 at 1. Thus, a POSITA would have understood that the paging information could be allocated to a downlink shared channel and is broadcast, i.e., transmitted to UEs. Ex. 1003, ¶ 97.

Furthermore, as discussed above, R1-060576 discloses that the shared control channel shown in Figure 1 below “serves the purpose of a paging indicator. If the UE detects scheduling control information, through the presence of its own identity or a common paging group identity, the data part of the downlink transmission is

received and further processed by higher layers. Otherwise, the UE reverts to sleeping until the next paging occasion.” Ex. 1011 at 1. A POSITA would have understood that the UE can detect scheduling control information because the control channel is transmitted to the UE. Ex. 1003, ¶ 98.

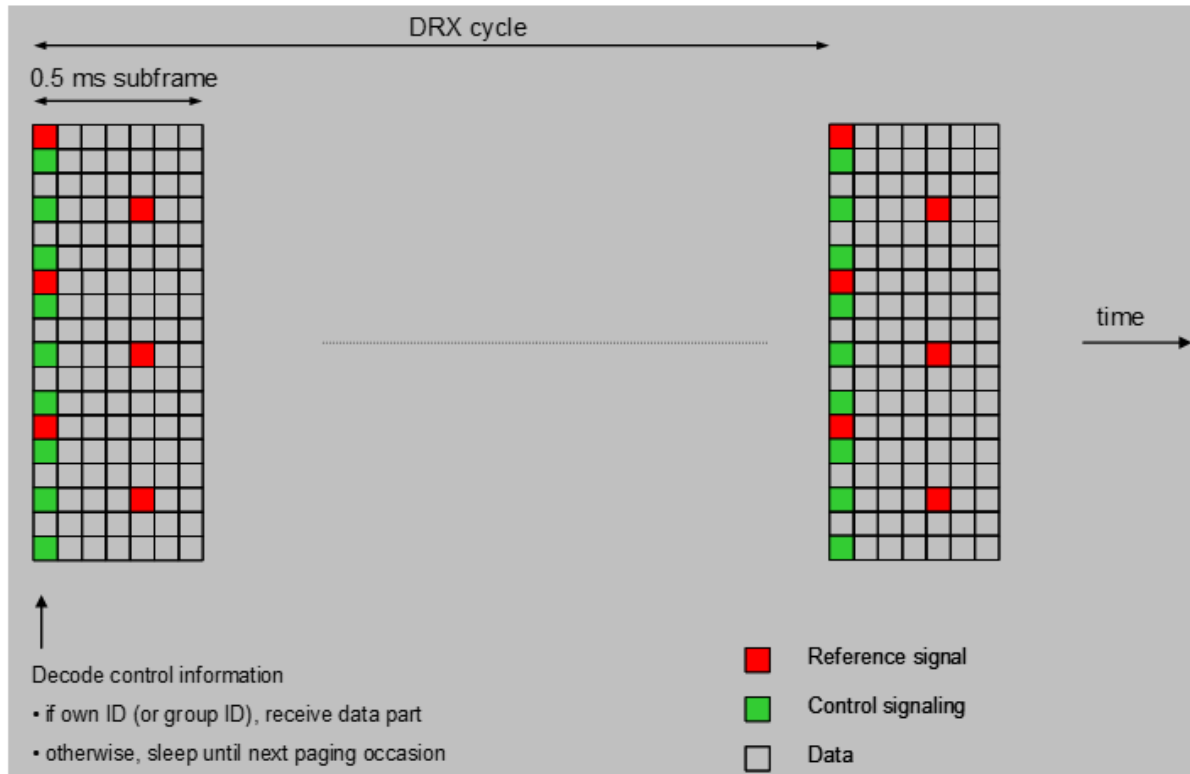


Figure 1: Schematic illustration of the paging mechanism (the amount of reference signals, location of control information, etc is not to scale).

Ex. 1011 at Figure 1.

To the extent R2-060429 is found not to does not disclose “the downlink shared channel,” R2-060429 in view of R1-060572 would have rendered this limitation obvious under either side’s proposed construction for this term. R1-060572 discloses that “paging messages (‘PCCH’) and system information (‘BCCH’) can be transmitted in the same way as data being transmitted using the

DL-SCH or, more exactly, the physical-layer characteristics of transfer of paging messages and system information can be assumed to be a sub-set of the possible physical-layer characteristics of DL-SCH transmission.” Ex. 1008 at 2; *see also* Ex. 1003, ¶ 99.

5. [10.5] “wherein when the paging information is not generated, the identifier is not allocated to the control channel, and”

A POSITA would have understood R2-060429 in view of R1-060576 to teach this limitation. Ex. 1003, ¶ 100. R2-060576 discloses that “[i]f the UE detects scheduling control information, through the presence of its own identity or a common paging group identity, the data part of the downlink transmission is received and further processed by higher layers.” R2-060576 at 1. However, if no scheduling control information, i.e., identifier, is received, “the UE reverts to sleeping until the next paging occasion.” R2-060576 at 1. Similarly, in WCDMA, “[i]f the UE receives a paging indicator, it performs further processing of paging information transmitted on a separate channel.” R2-060576. A POSITA would have understood that only when there is paging information generated does the scheduling control information or paging indicator, i.e., the identifier, get allocated to the control channel. Ex. 1003, ¶ 100.

6. [10.6] “wherein the identifier is used by reserving and allocating a part of scheduling identifiers.”

A POSITA would have understood R2-060429 in view of R1-060576 renders this limitation obvious. Ex. 1003, ¶¶ 101-105.

With respect to the term “scheduling identifiers,” R1-060576 discloses use of the shared control channel shown in Figure 1 of R1-060576 to “serve[] the purpose of a paging indicator. If the UE detects *scheduling control information, through the presence of its own identity or a common paging group identity*, the data part of the downlink transmission is received and further processed by higher layers.” Ex. 1011 at 1 (emphasis added). This disclosure meets the proposed construction of “scheduling identifiers” by Patent Owner and the preliminary construction by the Court.⁵ This is particularly true given that Patent Owner has taken a position in the Related Litigations that LTE implementations meet the claim element when LTE allows for use of common paging group identifier (the paging radio network temporary identifier “P-RNTI”). Ex. 1003, ¶ 102.

Moreover, R1-060576’s disclosure of “*scheduling control information, through the presence of its own identity or a common paging group identity* in combination with the knowledge of a POSITA meets Defendants’ proposed

⁵ See § V *supra*.

construction of “scheduling identifiers.”⁶ It was well understood that an efficient way to indicate a UE’s “own identity” for LTE scheduling is through the use of a “cell radio network temporary identifier” or “C-RNTI,” a concept used in LTE to refer to an identifier of a specific terminal. *See, e.g.*, Ex. 1003, ¶ 103 (citing 3GPP TR 25.813 v0.8.1 (2005-04) at 20 (“The C-RNTI provides a unique UE identification at the cell level; - It is assumed that this identity is used for scheduling unless the cost would turn out to be too high and the introduction of a separate MAC-Id would be required.”)). To the extent not disclosed by R1-060576, a POSITA would have been motivated to combine its understanding of C-RNTI’s with R1-060576 in order to use known resources for identifying a UE. Ex. 1003, ¶ 103.

R2-060576 also discloses the longer phrase “the identifier is used by reserving and allocating a part of scheduling identifiers.” As stated above, R1-060576 discloses that the identifier can be either a UE’s own identity or a common paging group identity. Ex. 1011 at 1. This disclosure meets the proposed construction of “the identifier is used by reserving and allocating a part of [scheduling identifiers]” by Patent Owner and the preliminary construction by the Court under Patent Owner’s interpretation of the element.⁷ In particular, the Patent Owner has taken a

⁶ *See* § V *supra*.

⁷ *See* § V *supra*.

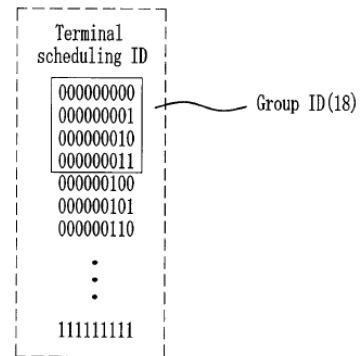
position in the Related Litigations that LTE implementations meet the claim element when LTE allows for use of common paging group identifier (the paging radio network temporary identifier “P-RNTI”) in addition to other identifiers (for example, cell network temporary identifiers “C-RNTIs”). *See, e.g.*, Ex. 1003, ¶ 104. Similarly, R2-060576 discloses a system that can reserve and allocate at least two types of identifiers (a UE’s own identity or a common paging group identity) and a POSITA would understand that LTE was being developed with multiple identifiers. *See, e.g.*, Ex. 1003, ¶ 104 (citing 3GPP TR 25.813 v0.8.1 (2005-04) at 20 (“The C-RNTI provides a unique UE identification at the cell level.)).

R2-060576 in combination with the knowledge of a POSITA also renders the phrase “the identifier is used by reserving and allocating a part of scheduling identifiers” obvious under Defendants’ proposed construction.⁸ As stated above, R2-060576 discloses identifiers such as UE-specific identifiers and a common paging group identity. Similarly, the ’066 Patent discloses a process that reserves a part of UE/terminal-specific IDs to allocate as a group ID for paging:

⁸ *See* § V *supra*.

As shown in FIG. 5, the present invention is operated by reserving and allocating a part of the information included in the terminal scheduling ID as a group ID for paging information. The group ID is an ID used by reserving and allocating a part of a scheduling ID (i.e., a cell radio network temporary identifier (C-RNTI)) for uniquely identifying a terminal. A base station may operate by reserving at least one scheduling ID.

FIG. 5



Ex. 1001 at 6:3-10 (emphasis added). Additionally, reserving and allocating specific data as a group ID was a well known process. Ex. 1003, ¶ 105. Additionally, to the extent not already disclosed by R2-060576, a POSITA would have been motivated to combine its knowledge of reserving and allocating part of specific values as a group ID with R2-060576's disclosure in order to develop a more efficient system and utilize existing resources (e.g., UE-specific IDs) to add additional functionality (e.g., use as a group paging ID). *Id.*

7. Claim 16: “The method of claim 10, wherein the terminal is in Radio Resource Control (RRC) Connected state.”

A POSITA would have understood R2-060429 to teach this limitation. Ex. 1003, ¶ 106. R2-060429 discloses “wherein the terminal is in Radio Resource Control (RRC) Connected state.” R2-060429 discloses that “[i]n LTE RRC Active mode, a UE may monitor the PCH in continuous mode or in DRX mode (in LTE-MAC level).” Ex. 1010 at 2; *see also* Ex. 1003, ¶ 106.

8. A POSITA would have been motivated to combine R2-060429 with R1-060572 and R1-060576

A POSITA would have been motivated to combine the teachings of R2-060429 with R1-060572 and R1-060576. Each of these references relates to paging in a cellular communication system, with R2-060429 and R1-060572 specifically relating to transport channels for paging and system information in a cellular communication system. *See, e.g.*, Ex. 1010 at 2 (“[T]he [paging channel] PCH carries broadcast data of Paging Information, and that the UE listens to the PCH in either continuous or DRX mode depending on their state for power-saving purposes.” “[B]oth the PCH and the DL-SCH may share physical resources.”); R1-060572 (“Thus one may question if there really is a need to define specific transport-channel types (PCH and BCH) for transmission of paging messages and system information or if these should be transmitted using the DL-SCH.”); R1-060576 (“An efficient paging procedure should allow the UE to sleep with no receiver processing most of the time and to briefly wake up at predefined time intervals to monitor paging information from the network.”). More specifically, each of these references were paging contributions proposed for 3GPP’s standardization of the fourth-generation cellular communication system known as LTE. *See, e.g.*, Ex. 1010 at 1 (“We provide in this part an analysis of some of the points relating to the Paging Channel in [1] in order to extend the model for the Paging Channel in the E-UTRAN.”); R1-060572 (“the BCCH and PCCH could be mapped to the DL-SCH,

leading to a more simple E-UTRA transport-channel structure.”); R1-060576 (“For LTE, paging can rely on the shared control channel, monitored at predefined time instants (DRX cycle, configured by higher layers).”). Each reference is also related to a common goal of efficiently using radio resources for paging transmission from the base station to the UE. *See, e.g.*, Ex. 1010 at 1 (“[T]he [paging channel] PCH will be a separate transport channel from the Downlink Shared Channel (DL-SCH), while being mapped to physical resources that can be shared with other traffic or control channels such as the DL-SCH.”); Ex. 1008 at 2 (“paging messages (‘PCCH’) and system information (‘BCCH’) can be transmitted in the same way as data being transmitted using the DL-SCH.”); R1-060576 (“No paging indicator channel is necessary as the potential power savings are very small thanks to the short subframe duration. Instead, the shared control channel serves the purpose of a paging indicator.”). Thus, a POSITA would have been motivated to combine the proposed solutions in these references. Ex. 1003, ¶¶ 89, 107, 109.

A POSITA would also have been motivated to combine R1-060572’s teaching of mapping a paging message to the transport downlink shared channel (DL-SCH), rather than a separate transport paging channel (PCH) as disclosed in R2-060429, because both references contemplate how to best map transport channels to physical channels to achieve the common goal of efficiently using radio resources efficiently. Indeed, R2-060429 already contemplates combining the paging channel (PCH) with

the downlink shared channel (DL-SCH). *See* Ex. 1010 at 2 (“[W]e advocated the merging of the PCH together with the DL-SCH as transport channels for a simplification of the number of transport channels.”). Ex. 1003, ¶ 108.

A POSITA would also have been motivated to combine R1-060576’s teaching of using the physical layer shared control channel frame, e.g., as disclosed in Figure 1 of R1-060576, as the “physical resources that can be shared with other traffic or control channels” disclosed in R2-060429. Each of these references discuss a physical channel for shared control resources in the same cellular communications system, and “frames” were a well-understood time unit of data for cellular communications. *See* Ex. 1010 at 1; Ex. 1011 at 1; Ex. 1003, ¶ 110. Furthermore, a POSITA would have been motivated to combine the R1-060576’s teaching of detecting “scheduling control information, through the presence of its own identity or a common paging group identity” with Ex. 1010 at least because use of identifiers was well known in LTE and the Scheduling Control Channel disclosed in R2-060429 is also disclosed as minimal scheduling indicator to indicate the presence of paging information on the paging channel (PCH). Ex. 1011 at 1; Ex. 1010 at 2; Ex. 1003, ¶ 110. Additionally, the motivation is further supported because LTE envisioned transmitting control information (in a control channel) at the start of the downlink frame—therefore including an identifier for paging in the control channel allows a UE reduce the amount of time and resources it needs to spend monitoring whether

an identifier is present through use of R21-060576's disclosed solution. Ex. 1003, ¶ 110.

B. Ground 2: Claim 11 is Obvious Under 35 U.S.C. § 103(a) Over R2-060429 in View of R1-060572 (to the extent necessary), R1-060576, and R1-060187

1. Claim 11: “The method of claim 10, wherein the control channel and the downlink shared channel are physical channels.”

Claim 10 is invalid for the reasons discussed above in Ground 3. A POSITA would have understood R2-060429 in view of R1-060187 renders this limitation obvious. Ex. 1003, ¶ 112. As is disclosed in Figure xy of R1-060187, shown below, both the Physical Downlink Shared Channel (PDSCH) and Physical Downlink Shared Control Channel (PDSCCH) are shown to be physical channels. Ex. 1003, ¶ 112. A POSITA would have understood that a PDSCH is a “downlink shared channel” because, as Sol IP has proposed to construe the term and under the Court’s preliminary construction, it is a shared channel used for downlink. *Id.* A PDSCCH is a physical control channel. *Id.*

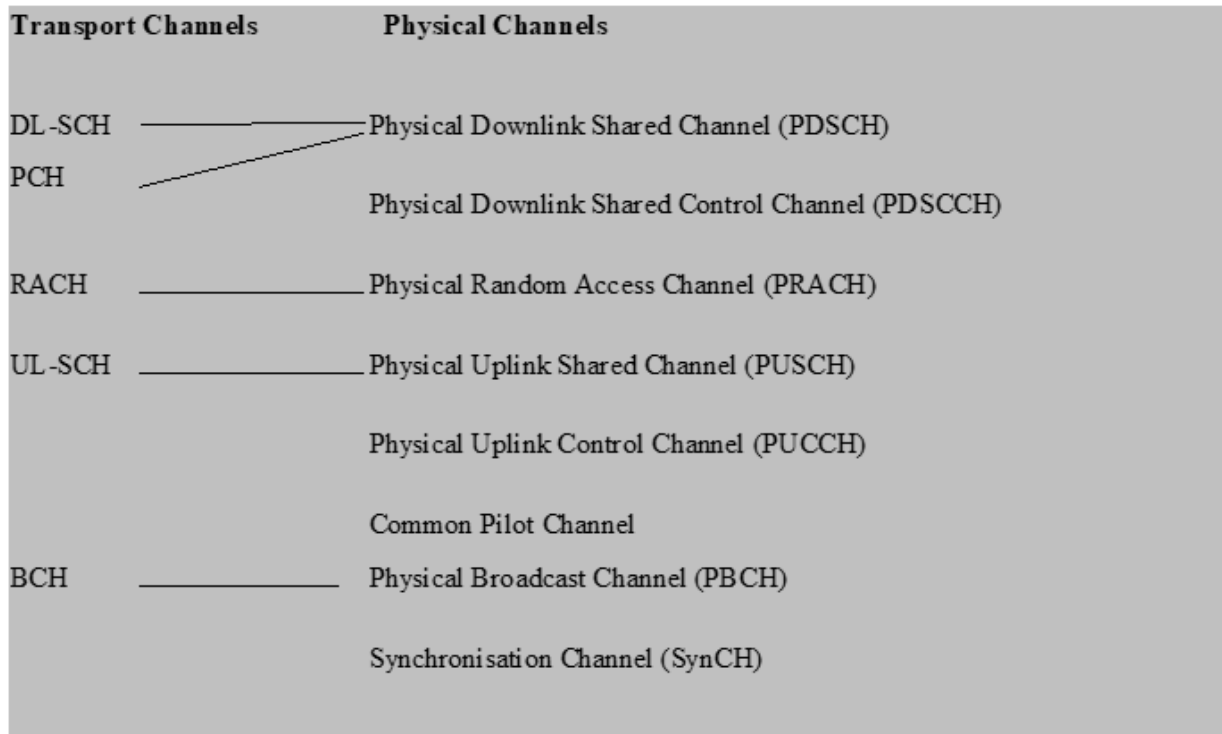


Figure xy: Transport-channel to physical-channel mapping

Ex. 1012 at Figure xy.

2. A POSITA would have been motivated to combine R2-060429 with R1-060572, R1-060576, and R1-060187

As explained above in § VII.A.8 for Ground 1, a POSITA would have been motivated to combine R2-060429 with R1-060572 and R1-060576.

A POSITA would also have been motivated to combine the teachings of R2-060429 with R1-060187. Each of these references relates to paging in a cellular communication system. *See, e.g.*, Ex. 1010 at 2 (“[T]he [paging channel] PCH carries broadcast data of Paging Information, and that the UE listens to the PCH in either continuous or DRX mode depending on their state for power-saving purposes.”); R1-060187 (“Note that the Paging Indicator Channel (PCH) is carried

with other L1/L2 control information on PDSCCH.”). More specifically, each of these references were paging contributions proposed for 3GPP’s standardization of the fourth-generation cellular communication system known as LTE. *See, e.g.*, Ex. 1010 at 1 (“We provide in this part an analysis of some of the points relating to the Paging Channel in [1] in order to extend the model for the Paging Channel in the E-UTRAN.”); R1-060187 (“Included in this contribution is a text proposal for mapping from DL Transport Channels to Physical Channel for E-UTRA.”). Each reference is also related to a common goal of efficiently using radio resources for paging transmission from the base station to the UE. *See, e.g.*, Ex. 1010 at 1 (“[T]he [paging channel] PCH will be a separate transport channel from the Downlink Shared Channel (DL-SCH), while being mapped to physical resources that can be shared with other traffic or control channels such as the DL-SCH.”); R1-060187 (“Note that the Paging Indicator Channel (PCH) is carried with other L1/L2 control information on PDSCCH.”). Thus, a POSITA would have been motivated to combine the proposed solutions in these references. Ex. 1003, ¶ 114.

A POSITA would also have been motivated to combine R1-060187’s teaching of the Physical Downlink Shared Channel (PDSCH) and Physical Downlink Shared Control Channel (PDSCCH) as physical channels that can be used in R2-060429. R2-060429 discloses that “[paging channel] PCH will be a separate transport channel from the Downlink Shared Channel (DL-SCH), while being mapped to

physical resources that can be shared with other traffic or control channels such as the DL-SCH.” Ex. 1010 at 1. The same paging channel (PCH) and downlink shared channel (DL-SCH) are both shown in Figure xy of R1-060187 mapped to the Physical Downlink Shared Channel (PDSCH), highlighted below.

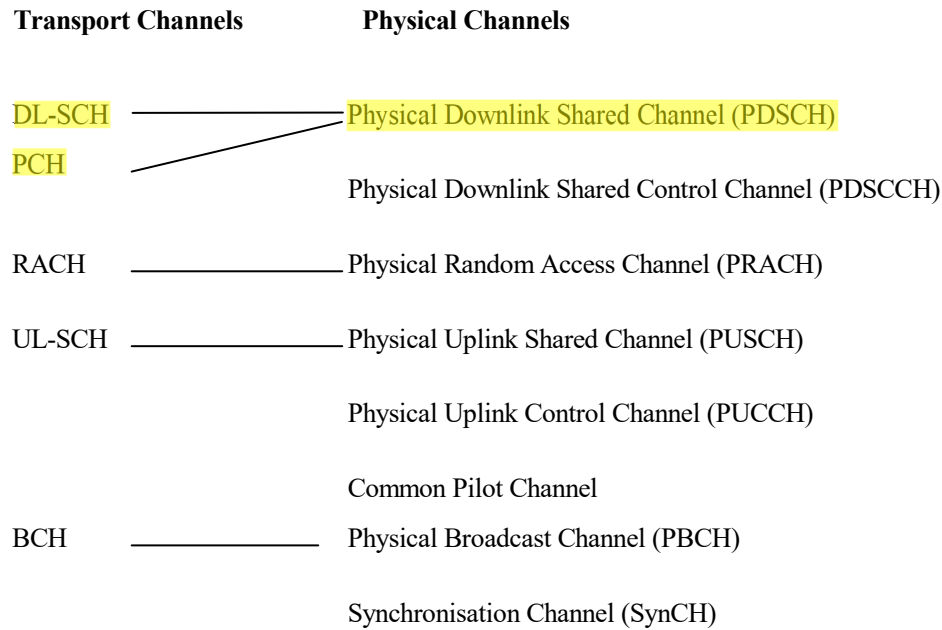


Figure xy: Transport-channel to physical-channel mapping

Ex. 1012 at Figure xy. Accordingly, it would have been obvious to a POSITA that the “physical resources that can be shared with other traffic or control channels” disclosed in R2-060429 can be the physical downlink shared channel (PDSCH) that the downlink shared channel (DL-SCH) transmits on and the Physical Downlink Shared Control Channel (PDSCCH) that control signals transmit on. Ex. 1003, ¶ 115.

C. Ground 3: Claims 10 and 11 are Obvious Under 35 U.S.C. § 103(a) Over R2-060988 in View of R1-060572 and TR 25.814

1. Claim 10: [10.1] “A method for transmitting paging information, performed in a base station, the method comprising:”

To the extent the preamble is limiting, R2-060988 discloses it. R2-060988 “discusses the paging mapping and paging control procedure.” Ex. 1007 at 4. Specifically, R2-060988 discloses a paging control procedure for the eNodeB, a base station, to communicate paging information to a user equipment. “If there is [a] paging message coming from aGW [access gateway], the eNodeB sends paging indicator and resources indicating of DPSCH on DSCCH when the paging occasion comes . . . UEs in LTE-IDLE monitor the DSCCHs that may carry paging indicators with DRX period.” Ex. 1007 at 2; *see also* Ex. 1003, ¶ 117.

Additionally, during prosecution, the Examiner found that R2-060988 disclosed this element, and the Applicant did not challenge that finding. *See* Ex. 1002.

2. [10.2] “when a paging information is generated, allocating the paging information to a downlink shared channel;”

R2-060988 discloses “when a paging information is generated, allocating the paging information to a downlink shared channel.” R2-060988 discloses that “[i]f there is paging message coming from aGW, the eNodeB sends paging indicator and resources indicating of DPSCH on DSCCH when the paging occasion comes, and set the PI-ID in the DSCCH frame instead of C-RNTI at the same time.” Ex. 1007

at 2. R2-060988 further discloses the contrasting situation where paging information is not generated. *Id.* (“[i]f the UE-ID is not the PI-ID, it means there is no paging information”); *see also* Ex. 1003, ¶ 118.

When paging information is generated, “[i]t is proposed that the PCH is mapped on the *downlink physical shared channel*, and the paging indicating channel is combined with downlink shared control channel.” Ex. 1007 at 1 (emphasis added). Specifically, R2-060988 discloses that “PCH can be mapped on the downlink physical shared channel (named as DPSCCH for short).” A POSITA would have understood that the DPSCCH is a downlink shared channel under Patent Owner’s proposed construction and the Court’s Preliminary Construction. Ex. 1003, ¶ 119.

To the extent R2-060988 is found not to does not disclose “allocating the paging information to a downlink shared channel,” R2-060988 in view of R1-060572 would have rendered this limitation obvious under both side’s proposed construction for “downlink shared channel.” R1-060572 discloses that “paging messages (‘PCCH’) and system information (‘BCCH’) can be transmitted in the same way as data being transmitted using the DL-SCH or, more exactly, the physical-layer characteristics of transfer of paging messages and system information can be assumed to be a sub-set of the possible physical-layer characteristics of DL-SCH transmission.” Ex. 1008 at 2; *see also* Ex. 1003, ¶ 120.

Additionally, during prosecution, the Examiner found that R2-060988 disclosed this element, and the Applicant did not challenge that finding. *See* Ex. 1002.

3. [10.3] “allocating an identifier indicating existence of the paging information and a radio resource allocation information indicating radio resource to which the paging information is allocated to a control channel; and”

R2-060988 discloses “allocating an identifier indicating existence of the paging information and a radio resource allocation information indicating radio resource to which the paging information is allocated to a control channel.” R2-060988 discloses a paging indicator transmitted through the control channel as an identifier for indicating the existence of the paging information. “If the paging indicator is presented on DSCCH, the corresponding resource of DPSCCH will be utilized to transfer the data of [paging channel] PCH.” Ex. 1007 at 2. A POSITA would have understood that the data of PCH is paging information. Ex. 1003, ¶ 121. “In the SFN #10, paging indicator is presented on DSCCH, and the PCH information appears in SFN #11.” Ex. 1007 at 2.

Furthermore, R2-060988 discloses that the control channel includes radio resource allocation information indicating the radio resource to which the paging information is allocated. “If there is paging message coming from aGW, the eNodeB sends paging indicator *and resources indicating of DPSCCH* on DSCCH when the paging occasion comes, and set[s] the PI-ID in the DSCCH frame instead of C-RNTI

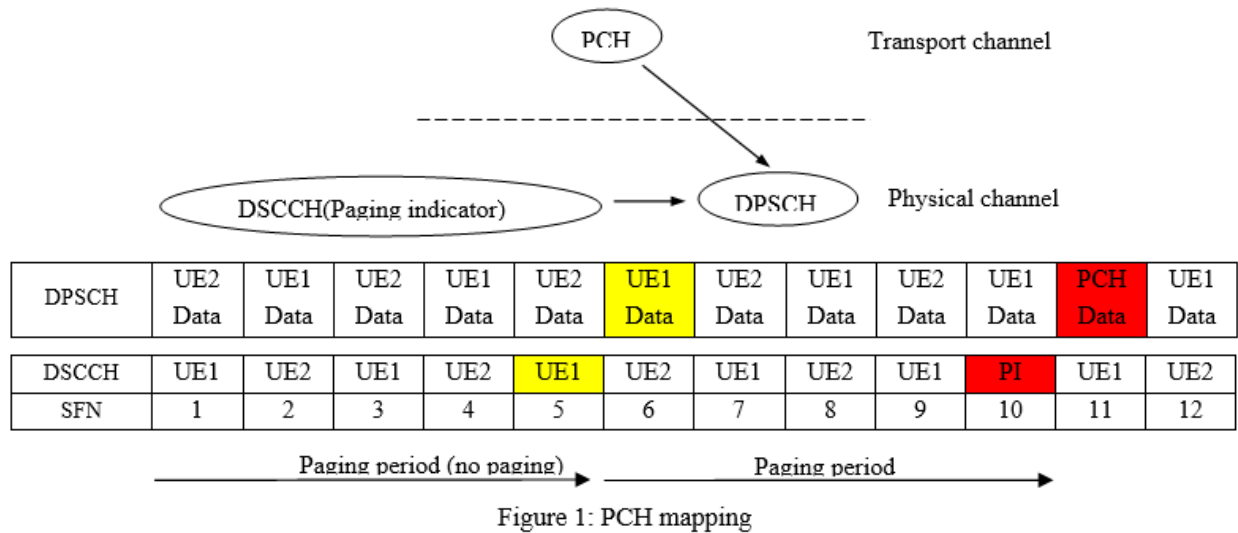
at the same time.” Ex. 1007 at 2 (emphasis added). The paging data is carried on the DPSCH. “When the UE-ID is PI-ID, UEs will read the paging indicator belonging to themselves. . . . the UE reads scheduling information; and receives the paging data carried on DPSCH, and then deals with paging message.” Ex. 1007 at 2; *see also* Ex. 1003, ¶ 122.

Additionally, during prosecution, the Examiner found that R2-060988 disclosed this element, and the Applicant did not challenge that finding. *See* Ex. 1002.

4. [10.4] “transmitting the control channel and the downlink shared channel to a terminal,”

R2-060988 discloses “transmitting the control channel and the downlink shared channel to a terminal.” R2-060988 discloses that “the PCH is mapped on the downlink physical shared channel, and the paging indicating channel is combined with downlink shared control channel.” Ex. 1007 at 1. Further, “[a]s PCH is mapped on DPSCH and the scheduling information of DPSCH is carried on the downlink shared control channel (named as DSCCH for short), we can combined [*sic*] the paging indicating channel into DSCCH.” Ex. 1007 at 1. A POSITA would have understood that the DSCCH is a control channel, and the DPSCH is the physical downlink shared channel that the PCH is mapped to, which is a “downlink shared channel” under Sol IP’s proposed construction and the Court’s Preliminary Construction. Ex. 1003, ¶ 123.

Figure 1 of R2-060988 is shown below.



Ex. 1007 at Figure 1 (annotated in original). R2-060988 discloses that the DSCCH and DPSCH are both transmitted from the eNodeB to a UE. Ex. 1007 at 2 (“If there is no paging, the eNodeB transfers scheduling information on the DSCCHs with a C-RNTI allocated to a UE, then transfers data on the related DPSCH. If there is [a] paging message coming from aGW, the eNodeB *sends* paging indicator and resources indicating of DPSCH on DSCCH when the paging occasion comes, and set[s] the PI-ID in the DSCCH frame instead of C-RNTI at the same time.”) *Id.* (emphasis added); *see also* Ex. 1003, ¶ 124.

To the extent R2-060988 is found not to does not disclose “the downlink shared channel,” R2-060988 in view of R1-060572 would have rendered this limitation obvious under both side’s proposed construction for this term. As discussed above, R1-060572 discloses that “paging messages (‘PCCH’) and system

information (‘BCCH’) can be transmitted in the same way as data being transmitted using the DL-SCH or, more exactly, the physical-layer characteristics of transfer of paging messages and system information can be assumed to be a sub-set of the possible physical-layer characteristics of DL-SCH transmission.” Ex. 1008 at 2. In other words, a downlink shared channel, DL-SCH can be used in place of the PCH in R2-060988. Ex. 1003, ¶ 125. “Thus one may question if there really is a need to define specific transport-channel types (PCH and BCH) for transmission of paging messages and system information or if these should be transmitted using the DL-SCH.” Ex. 1008 at 2.

Additionally, during prosecution, the Examiner found that R2-060988 disclosed this element, and the Applicant did not challenge that finding. *See* Ex. 1002.

5. [10.5] “wherein when the paging information is not generated, the identifier is not allocated to the control channel, and”

R2-060988 discloses “wherein when the paging information is not generated, the identifier is not allocated to the control channel.” R2-060988 discloses that either a PI-ID or a C-RNTI is sent on the DSCCH depending on whether there is a paging message coming from aGW. “If there is no paging, the eNodeB transfers scheduling information on the DSCCHs with a C-RNTI allocated to a UE, then transfers data on the related DPSCCH. If there is paging message coming from aGW, the eNodeB

sends paging indicator and resources indicating of DPSCH on DSCCH when the paging occasion comes, and set the PI-ID in the DSCCH frame instead of C-RNTI at the same time.” Ex. 1007 at 2. Thus, when there is no paging information generated, a PI-ID is not allocated on the control channel DSCCH; a C-RNTI is allocated on the control channel DSCCH instead. Ex. 1003, ¶ 126.

6. [10.6] “wherein the identifier is used by reserving and allocating a part of scheduling identifiers.”

R2-060988 alone, or in view of TR 25.814, discloses “wherein the identifier is used by reserving and allocating a part of scheduling identifiers.”

With respect to the term “scheduling identifiers,” R2-060988 discloses use of a “C-RNTI.” Ex. 1007 at 2. A POSITA would understand “C-RNTI” to refer to a “cell radio network temporary identifier,” a concept used in LTE to refer to an identifier of a specific terminal. Ex. 1003, ¶ 128. Thus, the disclosure of C-RNTI encompasses both party’s proposed construction of “scheduling identifiers” and the Court’s preliminary construction.⁹

R2-060988 also discloses the longer phrase “the identifier is used by reserving and allocating a part of [scheduling identifiers]” under Sol IP’s proposed construction and the Court’s preliminary construction under Patent Owner’s interpretation of the element.” In the Related Litigations, Sol IP is asserting that

⁹ See § V *supra*.

LTE meets this proposed construction because the protocol uses a paging radio network temporary identifier (P-RNTI) in addition to cell radio network temporary identifiers (C-RNTIs). *See, e.g.*, Ex. 1003, ¶ 129. R2-060988 similarly discloses a system with a paging identifier that is a reserved and allocated part of the cell radio network temporary identifiers (C-RNTIs). *See* Ex. 1007 at 2 (“Introducing a PI-ID. This PI-ID equals to C-RNTI in size, and isn’t assigned to any UE for ever. When the special PI-ID has been detected, the content carried on DSCCH is a paging indicator.”). Ex. 1003, ¶ 129.

Additionally, R2-060988 in view of TR 25.814 would have rendered obvious “wherein the identifier is used by reserving and allocating a part of scheduling identifiers” under Defendants’ proposed construction of “the identifier is used by reserving and allocating a part of the information included in the terminal [scheduling identifier] as a group identifier for paging information,” as well as the Court’s Preliminary Construction for this term. As shown in Table 7.1.1.2.3.1-1 of TR 25.814 below, a downlink scheduling ID to specify where to transmit data can be either UE or group specific.

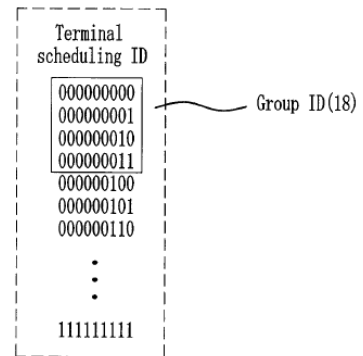
Table 7.1.1.2.3.1-1 Downlink scheduling information required by a UE

	Field		Size	Comment
Cat. 1 (Resource indication)	ID (UE or group specific)		8-9	Indicates the UE (or group of UEs) for which the data transmission is intended
	<u>Resource assignment</u>		<u>FFS</u>	<u>Indicates which (virtual) resource units (and layers in case of multi-layer transmission) the UE(s) shall demodulate.</u>
	<u>Duration of assignment</u>		<u>2-3</u>	<u>The duration for which the assignment is valid, could also be used to control the TTI or persistent scheduling.</u>
Cat. 2 (transport format)	<u>Multi-antenna related information</u>		<u>FFS</u>	<u>Content depends on the MIMO/beamforming schemes selected.</u>
	<u>Modulation scheme</u>		<u>2</u>	<u>QPSK, 16QAM, 64QAM. In case of multi-layer transmission, multiple instances may be required.</u>
	<u>Payload size</u>		<u>6</u>	<u>Interpretation could depend on e.g. modulation scheme and the number of assigned resource units (c.f. HSDPA). In case of multi-layer transmission, multiple instances may be required.</u>
Cat. 3 (HARQ)	<u>If asynchronous hybrid ARQ is adopted</u>	<u>Hybrid ARQ process number</u>	<u>3</u>	<u>Indicates the hybrid ARQ process the current transmission is addressing.</u>
		<u>Redundancy version</u>	<u>2</u>	<u>To support incremental redundancy.</u>
		<u>New data indicator</u>	<u>1</u>	<u>To handle soft buffer clearing.</u>
	<u>If synchronous hybrid ARQ is adopted</u>	<u>Retransmission sequence number</u>	<u>2</u>	<u>Used to derive redundancy version (to support incremental redundancy) and 'new data indicator' (to handle soft buffer clearing).</u>

Ex. 1009 at Table 7.1.1.2.3.1-1 (annotated). Similarly, the '066 patent discloses a process that reserves a part of UE/terminal-specific IDs to allocate as a group ID for paging:

As shown in FIG. 5, the present invention is operated by reserving and allocating a part of the information included in the terminal scheduling ID as a group ID for paging information. The group ID is an ID used by reserving and allocating a part of a scheduling ID (i.e., a cell radio network temporary identifier (C-RNTI)) for uniquely identifying a terminal. A base station may operate by reserving at least one scheduling ID.

FIG. 5



Ex. 1001 at 6:3-10 (emphasis added). Additionally, reserving and allocating specific data as a group ID was a well known process. Ex. 1003, ¶ 131. Additionally, to the extent not already disclosed by R2-060988, a POSITA would have been motivated to combine its knowledge of reserving and allocating part of specific values as a group ID with R2-060988's disclosure of "the UE-ID is PI-ID" (Ex. 1007 at 2) in order to develop a more efficient system and utilize existing resources (e.g., UE-specific IDs) to add additional functionality (e.g., use as a group paging ID). Ex. 1003, ¶ 131.

7. **Claim 11: "The method of claim 10, wherein the control channel and the downlink shared channel are physical channels."**

R2-060988 discloses "wherein the control channel and the downlink shared channel are physical channels." R2-060988 discloses that "the PCH is mapped on the downlink physical shared channel, and the paging indicating channel is combined with downlink shared control channel." Ex. 1007 at 1. Further, "[a]s PCH

is mapped on DPSCH and the scheduling information of DPSCH is carried on the downlink shared control channel (named as DSCCH for short), we can combined [sic] the paging indicating channel into DSCCH.” A POSITA would have understood that the DSCCH is a control channel, and the DPSCH is the physical downlink shared channel that the PCH is mapped to. Ex. 1003, ¶ 132.

Figure 1 of R2-060988 is shown below.

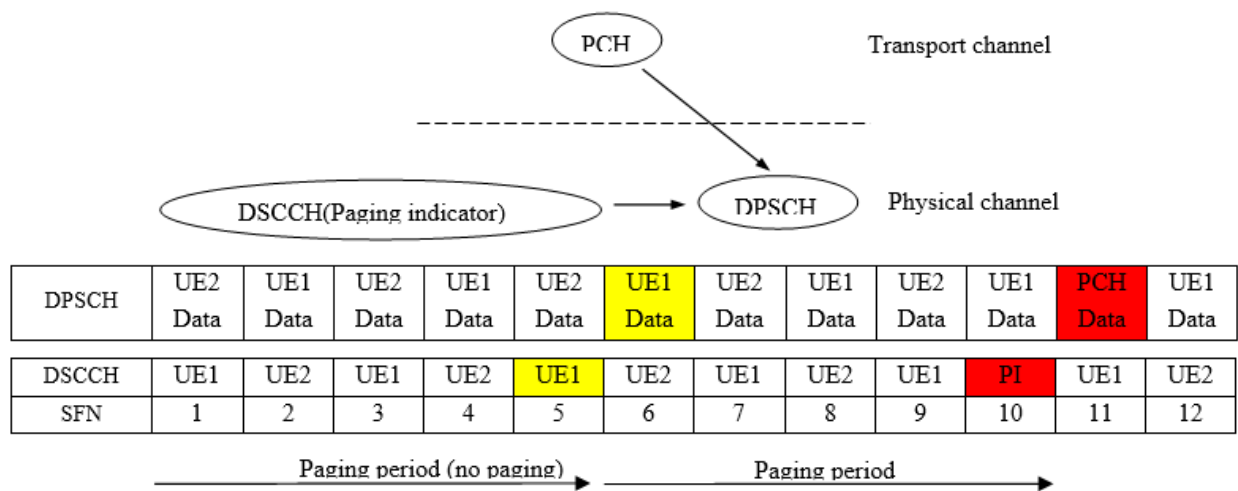


Figure 1: PCH mapping

Ex. 1007 at Figure 1 (annotated in original). Figure 1 discloses that both the DSCCH and DPSCH are physical channels. Ex. 1003, ¶ 133.

8. A POSITA would have been motivated to combine R2-060988 with R1-060572 and TR 25.814

A POSITA would have been motivated to combine the teachings of R2-060988 with R1-060572. Both R2-060988 and R1-060572 relate to transport channels for paging and system information in a cellular communication system. *See, e.g.*, Ex. 1007 at 2 (“As [paging channel] PCH is mapped on [downlink physical

shared channel] DPSCCH and the scheduling information of DPSCCH is carried on the downlink shared control channel (named as DSCCH for short), we can combined [sic] the paging indicating channel into DSCCH.”), Figure 1; R1-060572 (“Thus one may question if there really is a need to define specific transport-channel types (PCH and BCH) for transmission of paging messages and system information or if these should be transmitted using the DL-SCH.”). More specifically, both R2-060988 and R1-060572 were paging contributions proposed for 3GPP’s standardization of the fourth-generation cellular communication system known as LTE. *See, e.g.*, Ex. 1007 at 1 (“It is proposed that the PCH is mapped on the downlink physical shared channel, and the paging indicating channel is combined with downlink shared control channel.”); R1-060572 (“the BCCH and PCCH could be mapped to the DL-SCH, leading to a more simple E-UTRA transport-channel structure.”). Both R2-060988 and R1-060572 are also related to a common goal of efficiently using radio resources for paging transmission from the base station to the UE. *See, e.g.*, Ex. 1007 at 4 (“The PCH is mapped on the DPSCCH, and the paging indicating channel is combined with DSCCH. The radio resource is saved if the schemes were adopted and the scheduling of radio resource [sic] is very flexible.”); Ex. 1008 at 2 (“paging messages (‘PCCH’) and system information (‘BCCH’) can be transmitted in the same way as data being transmitted using the DL-SCH.”). Thus, a POSITA, would

have been motivated to combine proposed solutions in these references. Ex. 1003, ¶¶ 89, 134.

A POSITA would also have been motivated to combine the teachings of R2-060988 with TR 25.814. R2-060988 discusses the underlying motivation for developing a paging procedure for the next generation cellular standard, efficient use of radio resources for paging transmission from the base station to the UE. *See, e.g.*, Ex. 1007 at 1 (“While no paging, the DPSCCH doesn’t carry any content of PCH to save the radio resource.”). TR 25.814’s purpose is similar: to help “define and describe the potential physical layer evolution under consideration and compare the benefits of each evolution techniques” for the next generation cellular system, i.e., Evolved UTRA or LTE. Ex. 1009 at 8. TR 25.814 is described as a “living document,” and it is updated and presented at TSG-RAN meetings. *Id.* As discussed above, R2-060988 is a written contribution submission at the 3GPP RAN1/RAN2 joint meeting on LTE in Athens, Greece held on March 27-31, 2006. Thus, it is the exact type of document that contributes to updating the “living document” TR 25.814. Indeed, R2-060988 lists “[2] TR25.814 ‘Physical Layer Aspects for Evolved UTRA’” under “References.” Ex. 1007 at 5. Ex. 1003, ¶¶ 89, 136.

A POSITA would also have been motivated to combine R1-060572’s teaching of mapping a paging message to the transport downlink shared channel (DL-SCH), rather than a separate transport paging channel (PCH) as disclosed in R2-060988,

because both references contemplate how to best map transport channels to physical channels to achieve the common goal of efficiently using radio resources efficiently.

Ex. 1003, ¶ 135.

A POSITA would also have been motivated to combine TR 25.814’s teaching of using an ID that indicates a specific UE or a group of UEs as the paging indicator in R2-060988. § 7.1.1.2.3.1 of TR 25.814 discusses “[d]ownlink scheduling information [] used to inform the UE how to process the downlink data transmission.” Ex. 1009 at 26 (§ 7.1.1.2.3.1). Paging information is a type of downlink data transmission, and R2-060988 provides for “[t]wo solutions . . . for distinguishing the paging indicator and scheduling information on [physical downlink shared control channel] DSCCH.” Ex. 1007 at 2. Thus, it would have been obvious to a POSITA to consider techniques disclosed in TR 25.814, such as what kind of “ID (UE or group specific)” (Ex. 1009 at Table 7.1.1.2.3.1-1) to use as a scheduling identifier, and combine them with techniques disclosed in R2-060988, e.g., “the eNodeB sends paging indicator and resources indicating of DPSCCH on DSCCH when the paging occasion comes” (Ex. 1007 at 2), in developing a paging procedure for the next generation cellular standard. Ex. 1003, ¶ 137. Additionally, a POSITA would be motivated to include a group ID because paging sometimes requires sending cell-wide information (i.e., for the group of UEs in an area) that is not specific for any particular UE. *Id.* Including a group ID for these group

messages saves radio resources that would otherwise be required in allocating paging identifiers that are specific to each UE in a cell. *Id.*

D. Ground 4: Claim 16 is Obvious Under 35 U.S.C. § 103(a) Over R2-060988 in View of R1-060572, TR 25.814, and R2-060429 (to the extent necessary)

1. Claim 16: “The method of claim 10, wherein the terminal is in Radio Resource Control (RRC) Connected state.”

Claim 10 is invalid for the reasons discussed above in Ground 1. Furthermore, R2-060988 alone or in view of R2-060429 discloses “wherein the terminal is in Radio Resource Control (RRC) Connected state.” R2-060988 discloses that “UEs in LTE_ACTIVE state decide next execution based on the UE-ID taken on DSCCH like current system.” Ex. 1007 at 2; *see also id.* at 4 (“figure 3. The control procedure of Active UE using paging tag.”). A POSITA would have understood that LTE_ACTIVE state is when a UE is in a RRC Connected state. Ex. 1003, ¶ 139. Thus, R2-060988 discloses that the paging control procedure also executes the same as the current system when the UE is in the RRC Connected state, i.e., LTE_ACTIVE state. *Id.*

To the extent R2-060988 is found not to does not disclose this limitation, R2-060988 in view of R1-060429 would have rendered this limitation obvious. R2-060988 discloses a paging method where “UEs in LTE-IDLE monitor the DSCCHs that may carry paging indicators with DRX period.” Ex. 1007 at 2. R2-060429 discloses that a paging method in DRX mode could also be used wherein the terminal

is in a RRC connected state, i.e., in an RRC Active mode. Ex. 1003, ¶ 140. “In LTE RRC Active mode, a UE may monitor the PCH in continuous mode or in DRX mode (in LTE-MAC level).” Ex. 1010 at 2; *see also* Ex. 1003, ¶ 140.

2. A POSITA would have been motivated to combine R2-060988 with R1-060572, TR 25.814, and R2-060429

As explained above in § VII.C.8 for Ground 3, a POSITA would have been motivated to combine R2-060988 with R1-060572 and TR 25.814.

A POSITA would also have been motivated to combine the teachings of R2-060988 with R2-060429. Each of these references relates to paging in a cellular communication system. *See, e.g.*, Ex. 1007 at 1 (“This document discusses the PCH mapping and paging control in the physical layer.”); Ex. 1010 at 2 (“[T]he [paging channel] PCH carries broadcast data of Paging Information, and that the UE listens to the PCH in either continuous or DRX mode depending on their state for power-saving purposes.”). More specifically, each of these references were paging contributions proposed for 3GPP’s standardization of the fourth-generation cellular communication system known as LTE. *See, e.g.*, Ex. 1007 at 1 (“It is proposed that the PCH is mapped on the downlink physical shared channel, and the paging indicating channel is combined with downlink shared control channel.”); Ex. 1010 at 1 (“We provide in this part an analysis of some of the points relating to the Paging Channel in [1] in order to extend the model for the Paging Channel in the E-UTRAN.”). Each of these references is related to a common goal of efficiently using

radio resources for paging transmission from the base station to the UE. *See, e.g.*, Ex. 1007 at 1 (“While no paging, the DPSCCH doesn’t carry any content of PCH to save the radio resource.”); Ex. 1010 at 1 (“[T]he [paging channel] PCH will be a separate transport channel from the Downlink Shared Channel (DL-SCH), while being mapped to physical resources that can be shared with other traffic or control channels such as the DL-SCH.”). Thus, a POSITA, would have been motivated to combine proposed solutions in these references. Ex. 1003, ¶¶ 89, 142.

A POSITA would also have been motivated to combine R2-060429’s teaching of paging procedures that can be used in both “LTE Idle mode” and “LTE RRC Active mode.” Ex. 1010 at 2. R2-060429 discloses that “[i]n LTE RRC Active mode, a UE may monitor the PCH in continuous mode or in DRX mode (in LTE-MAC level).” *Id.* R2-060988 discloses a paging procedure for “UEs in LTE-IDLE [to] monitor the DSCCHs that may carry paging indicators with DRX period.” Ex. 1007 at 2. It would have been obvious to a POSITA to use R2-060988’s paging procedure in LTE RRC Active mode, because a UE may still monitor the physical downlink shared control channel (DSCCH) with DRX period in LTE RRC Active mode, as disclosed in R2-060429. Ex. 1003, ¶ 143.

VIII. CONCLUSION

For the reasons set forth above, ’066 Patent claims 10, 11, and 16 are unpatentable. Trial should be instituted, and the claims should be cancelled because

Petitioner has shown that there is a reasonable likelihood that one or more of the Challenged Claims is unpatentable in view of the foregoing Grounds.

IX. MANDATORY NOTICES UNDER 37 C.F.R. §42.8

A. Real Parties-In-Interest

Ericsson, Inc. and corporate parent Telefonaktiebolaget LM Ericsson are each a real party-in interest and they are not barred or estopped from requesting IPR of the '066 Patent.

B. Related Matters

The '066 Patent is subject to pending lawsuits entitled *Sol, IP, LLC v. AT&T Mobility LLC*, Case No. 2:18-cv- 526-RWS-RSP (E.D. Tex.); *Sol, IP, LLC v. Sprint Corporation, Sprint Communications Co. L.P., Sprint Solutions, Inc., Sprint Spectrum, L.P.*, Case No. 2:18-cv- 527-RWS-RSP (E.D. Tex.); and *Sol, IP, LLC v. Cellco Partnership d/b/a Verizon Wireless*, Case No. 2:18-cv- 528-RWS-RSP (E.D. Tex.) (the “Related Litigations”) in which Petitioner Ericsson Inc. has intervened and Nokia of America Corporation f/k/a Alcatel-Lucent USA Inc. has intervened.

Lead Counsel: Pejman Sharifi (Reg. # 45,097). Backup Counsel: Michael Rueckheim (*pro hac vice* to be filed), James Lin (*pro hac vice* to be filed).

Service Information: Petitioner consents to service by email on the following address: Winston-Ericsson-IPRs@winston.com. A Power of Attorney is filed concurrently herewith under 37 C.F.R. § 42.10(b).

X. CERTIFICATION UNDER 37 C.F.R. §42.24(D)

As calculated by the “Word Count” feature of Microsoft Word 2010, this Petition contains 13,233 words, excluding the following: Table of Contents, Table of Authorities, List of Exhibits, Mandatory Notices Under 37 C.F.R. §42.8, Certification Under §42.24(d), and Certificate of Service.

XI. PAYMENT OF FEES

The required fee is being paid through PTABE2E.

XII. TIME FOR FILING PETITION

This Petition is being filed within one year of Ericsson being served with a complaint alleging infringement of the '066 Patent. *See* 37 C.F.R. §42.101(b).

XIII. GROUNDS FOR STANDING

Under 37 C.F.R. §42.104(a), Ericsson certifies that the '066 Patent is available for *inter partes* review and that Ericsson is not barred or estopped from requesting *inter partes* review based on the grounds identified in this Petition. To the extent that any of the defendants in the related litigations (who had no role in this petition) are found to be real parties in interest, those defendants were served with a complaint on December 11, 2018, less than one year before the filing of this Petition, and thus do not pose a ground for barring or estopping this Petition.

Dated: December 10, 2019

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Lead Counsel for Petitioners s

Michael Rueckheim (to seek *pro hac vice* admission)

James Lin (to seek *pro hac vice* admission)

Back-Up Counsel for Petitioners

CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME LIMITATION

Pursuant to 37 C.F.R. § 42.24(a), I certify that the foregoing PETITION FOR *INTER PARTES* REVIEW contains 13,233 words (as calculated by the word processing system used to prepare the Petition), excluding the parts of the Petition exempted by 37 C.F.R. § 42.24(a)(1).

Dated: December 10, 2019

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CERTIFICATE OF SERVICE ON PATENT OWNER

Pursuant to 37 C.F.R. §§ 42.6(e) and 42.105(a), I certify that, on December 10, 2019, true and correct copies of the foregoing PETITION FOR *INTER PARTES* REVIEW, and all Exhibits thereto, were served by overnight courier service on Patent Owner at the correspondence address of record for U.S. Patent No. 9,155,066.

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