

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
Petitioner,

v.

INTELLECTUAL VENTURES II LLC,
Patent Owner.

IPR2025-00218
U.S. Patent No. 10,136,416

**PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. § 312 AND 37 C.F.R. § 42.104**

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PETITIONER’S EXHIBIT LIST

Ex.1001	U.S. Patent No. 10,136,416 to Beale et al. (“’416 patent”)
Ex.1002	Prosecution File History of U.S. Patent Application No. 15/611,309 issued as the ’416 Patent
Ex.1003	Declaration of Zhi Ding under 37 C.F.R. § 1.68
Ex.1004	<i>Curriculum Vitae</i> of Zhi Ding
Ex.1005	U.S. Patent No. 8,761,814 to Kim et al. (“Kim”)
Ex.1006	U.S. Patent No. 8,144,735 to Vayanos et al. (“Vayanos”)
Ex.1007	U.S. Patent No. 7,606,226 to Yi et al. (“Yi”)
Ex.1008	PCT Pub. No. WO2007/123360
Ex.1009	U.S. Patent No. 9,674,818 to Beale et al.
Ex.1010	Complaint, <i>Intellectual Ventures II, LLC v. Tesla, Inc.</i> , No. 6:24-cv-188-ADA (WDTX)
Ex.1011	Proposed Scheduling Order, <i>Intellectual Ventures II, LLC v. Tesla, Inc.</i> , No. 6:24-cv-188-ADA (WDTX)
Ex.1012	Statistics on District Court Timing (as of June 30, 2024)
Ex.1013	Interim Procedure for Discretionary Denials in AIA Parallel District Court Litigation, June 21, 2022
Ex.1014	IV’s Preliminary Infringement Contentions, <i>Intellectual Ventures II, LLC v. Tesla, Inc.</i> , No. 6:24-cv-188-ADA (WDTX)
Ex.1015	Harri Holma & Antti Toskala, WCDMA for UMTS: Radio Access for Third Generation Mobile Communications (3rd ed. 2004)
Ex.1016	Director Vidal Memorandum, Updated Guidance on the Treatment of Statements of the Applicant in the Challenged Patent in <i>Inter Partes</i> Reviews under 35 U.S.C. § 311, June 9, 2022

I. INTRODUCTION

The prior art presented in this Petition teaches the same solution to the same problem described in U.S Patent No. 10,136,416 (“the ’416 patent”) (Ex.1001).

The ’416 patent relates to “allocating channel resources within a physical channel of a cellular communication system.” Ex.1001, 1:20-21. The ’416 patent purports to utilize radio resources (e.g., a timeslot and frequency) more efficiently by only placing a signaling channel into a frame when needed. Specifically, certain bits within the Broadcast Channel BCH are used to indicate to terminals whether a particular timeslot is to be used as a signaling channel (for paging) or a shared channel (for data). *See* Ex.1001, 9:53-58.

However, Kim (Ex.1005) shows that it was already known to avoid wasting resources by using bits within the broadcast channel to indicate whether radio resources are being used as shared channels (for data) or as signal channels (for paging). *See* Ex.1005, 5:9-21. Kim was not considered during prosecution of the ’416 patent.

Accordingly, pursuant to 35 U.S.C. §§ 311, 314(a), and 37 C.F.R. § 42.100, Tesla, Inc. (“Petitioner”) respectfully requests that the Board review and cancel as unpatentable under (pre-AIA) 35 U.S.C. § 103(a) claims 1-12 (hereinafter, the “Challenged Claims”) of the ’416 patent.

II. GROUNDS FOR STANDING

Petitioner certifies that the '416 patent is eligible for IPR and that Petitioner is not barred or estopped from requesting IPR challenging the patent claims. 37 C.F.R. § 42.104(a).

III. NOTE

Petitioner cites to exhibits' original page numbers, unless noted otherwise. **Emphasis** in quoted material has been added. Claim terms are presented in *italics*.

IV. TECHNOLOGY BACKGROUND

A. Cellular Communication

The '416 patent provides a background section that explains the purported state of the art at the time the '416 patent was filed. Ex.1001, 1:25-5:49. The '416 patent explains that “[k]nown cellular communication systems such as a Universal Mobile Telecommunications System (UMTS) Radio Access Network (UTRAN), standardised by the 3rd Generation Partnership Project (3GPP), typically consist of a set of radio network controllers (RNCs), Node B, also known as Node-Bs, and mobile stations (MSs), also known as User Equipment (UEs).” Ex.1001, 1:25-30. In the example cellular communication system 100 shown in Fig. 1 below, “Node Bs 110 are connected to an RNC 105 via an interface (Iub) 115.” Ex.1001, 1:47-48. “The Node Bs are connected wirelessly to the UEs 120.” Ex.1001, 1:52-53.

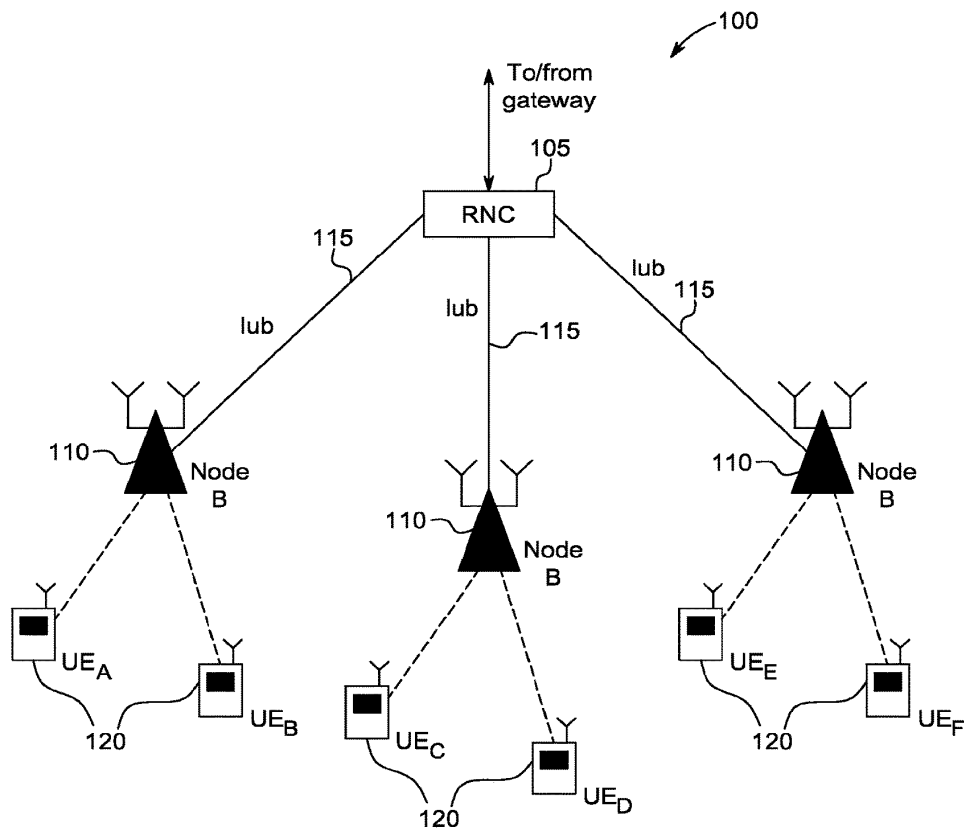


FIG. 1
PRIOR ART
Ex.1001, Fig. 1.

The Node Bs (base stations) communicate with the UEs (i.e., terminals) by transmitting signals that are formatted into frames. Ex.1003, ¶27. An example frame is shown in Fig. 3 below.

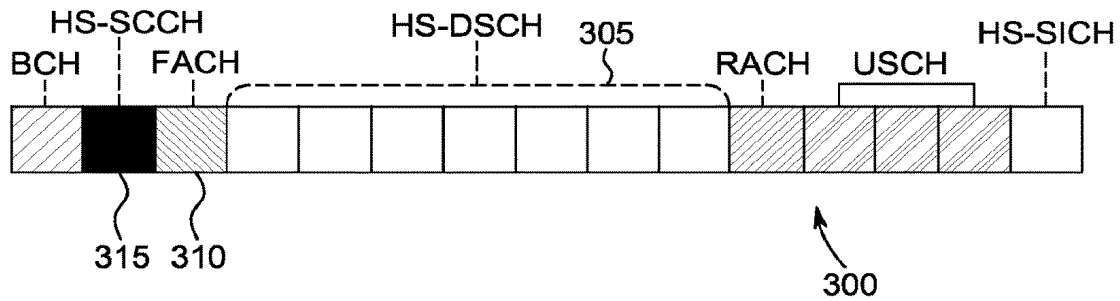


FIG. 3
PRIOR ART

Ex.1001, Fig. 3.

The conventional frame above includes a Broadcast Channel (BCH), a signal channel (e.g., Forward Access Channel (FACH)), and shared channels (e.g., High Speed Downlink Shared Channels (HS-DSCH)). *See* Ex.1001, 3:47-57; Ex.1003, ¶¶26-28.

B. Paging

When a UE is not involved in active connections, the UE will go into an idle state, whereby the UE powers down its radio frequency circuitry (RF) to conserve battery power. *See* Ex.1001, 1:54-57. The UE will “periodically power up its radio circuitry in order to monitor specific channels in order to determine whether it is required to establish a connection with the network,” e.g., for an incoming call. Ex.1001, 1:58-64; *see also* Ex.1015, 134 (describing the known paging procedure). Ex.1003, ¶29.

When the idle UE powers on its radio circuitry, it will first check what is

called the Paging Indication Channel (PICH). *See* Ex.1001, 2:12-18. “The PICH comprises multiple indicator bits. Each UE is associated with one of the indicator bits within the PICH.” Ex.1001, 2:12-14. “When in the idle state, the UE periodically decodes the PICH to see if the indicator bit with which it is associated has been set.” Ex.1001, 2:16-18; “If the relevant indicator has been set, the UE then reads the [Paging Channel] PCH.” Ex.1001, 2:7-20. “The PCH is a downlink transport channel that is used to carry control information to a UE.” Ex.1001, 2:7-8; Ex.1003, ¶30.

The UE uses an identifier to decode the information in the Paging Channel PCH. *See* Ex.1001, 2:21-31. “Each UE has a unique identifier (UE-ID).” Ex.1001, 2:21-25. “When the network pages a UE, as previously mentioned, the network ... transmits the UE-ID for the UE being paged, and the relevant message within the PCH.” Ex.1001, 2:21-25. The base station transmits the UE-ID in the Paging Channel PCH because “more than one UE may be associated with an indicator bit in the PICH.” Ex.1001, 2:25-27. “[T]he UE-ID enables a UE to determine whether the message is intended for that UE or not. If the PCH contains the UE-ID for the UE, the UE then reads the message, and performs the required actions.” Ex.1001, 2:27-30. Accordingly, “in the known art, the indicator bits are used ... to inform the UE whether it needs to turn its radio on for reading the PCH (i.e., as a battery saving mode).” Ex.1001, 2:30-31; Ex.1003, ¶31.

V. THE '416 PATENT

The '416 patent relates to “allocating channel resources within a physical channel of a cellular communication system.” Ex.1001, 1:20-21. In particular, the '416 patent purports to solve the known problem of wasting resources on unused signaling channels. *See* Ex.1001, 3:58-61 (using a signaling channel when not needed “is an inefficient use of physical resources.”). But the '416 patent addresses this waste of resources by using techniques that were already known and used in the prior art, including Kim (Ex.1005), as explained below. Ex.1003, ¶33.

The purported novelty of the '416 patent is using indicator bits in the Broadcast Channel (BCH) to indicate whether a particular timeslot within a frame should be used for signaling or as a shared channel. *See* Ex.1001, 9:38-58. “[T]he indicator bits are used to inform the UE whether it should be reading the resources ‘reserved’ for FACH as a FACH channel, or whether it should be ignoring those resources (for example when they are being used for another channel such as HS-DSCH).” Ex.1001, 9:53-58. The techniques described by the '416 patent apply not only to a FACH signaling channel, but to other types of signaling channels such as a Paging Channel (PCH). *See* Ex.1001, 9:38-41 (While “embodiments of the invention will be described in a context of a Forward Access Channel (FACH) ... the inventive concept described herein may be applied to any direct signalling channel, such as **a paging channel**.”); Ex.1003, ¶32.

The specification of the '416 patent describes how a signaling channel such as a FACH is conventionally allocated within a frame. *See* Ex.1001, 3:47-4:38. As shown below in Fig. 3 (admitted prior art), a frame includes a Broadcast Channel (BCH), a Forward Access Channel 310 (FACH), and several High-Speed Downlink Shared Channel (HS-DSCH) 305 timeslots. *See* Ex.1001, 3:47-55.

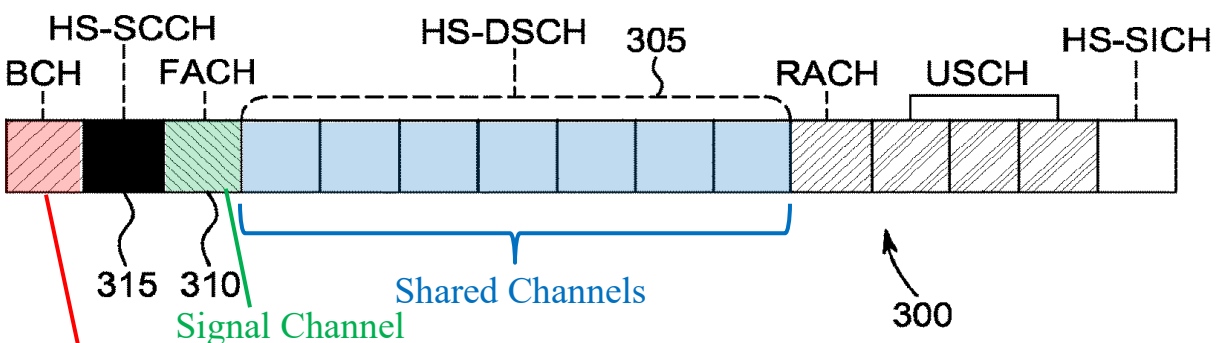
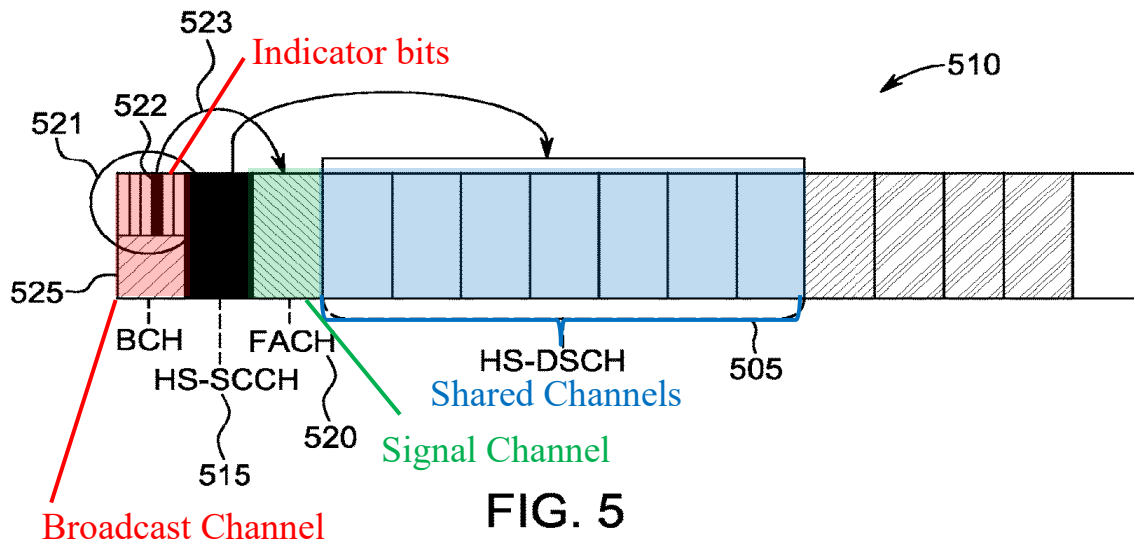


FIG. 3
PRIOR ART

Ex.1001, Fig. 3 (annotated); Ex.1003, ¶34.

The '416 patent illustrates its purported novelty of using indicator bits within the broadcast channel, shown in Fig. 5 below.



Ex.1001, Fig. 5 (annotated); Ex.1003, ¶35.

The '416 patent explains that an indicator bit (e.g., indicator bit 522) “is used to indicate whether a FACH channel to which it relates is ‘active.’” Ex.1001, 12:3-4. Thus, “[w]hen the NODE B 410 [Fig. 4] is required to send a FACH message, ... the NODE B 410 sets the FACH indicator bit 522.” Ex.1001, 12:7-10, 9:8-9 (“FIG. 4 shows part of a cellular communication system in accordance with embodiments of the invention.”). If, however, “no FACH message is required to be transmitted ... the FACH indicator bit 522 ... is not set.” Ex.1001, 12:25-28. This allows the system to “reallocate the FACH timeslot 520 for use by a channel other than the FACH, when no FACH message is required to be transmitted.” Ex.1001, 12:40-42. For example, “the FACH timeslot 520 is reallocated for use by the HS-DSCH 505. The HS-DSCH 505 is a shared channel.” Ex.1001, 12:43-45. The reallocated time slot is shown below in Fig. 6.

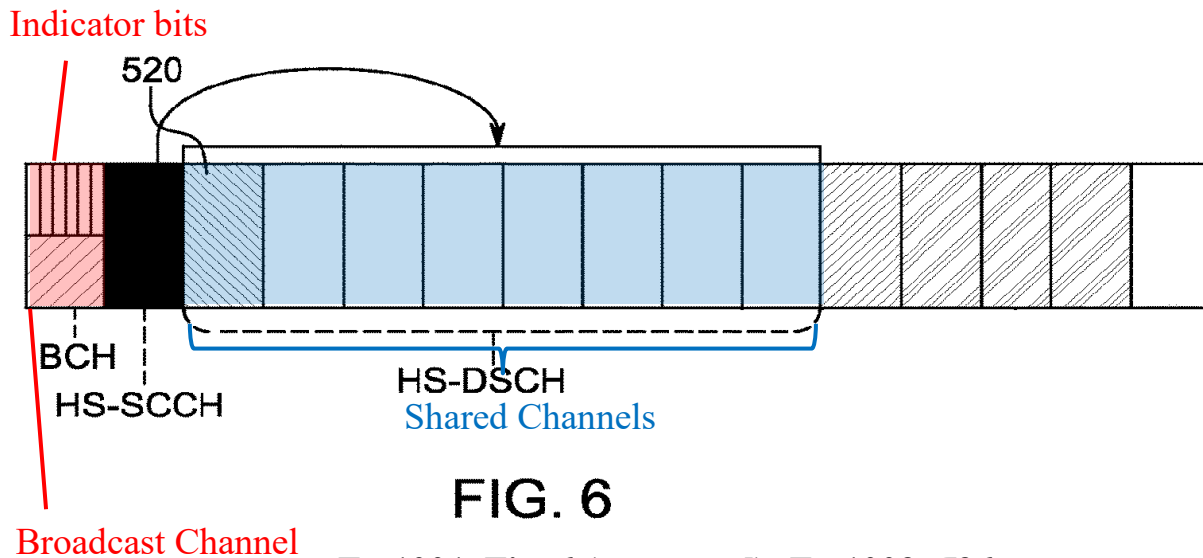


FIG. 6

Ex.1001, Fig. 6 (annotated); Ex.1003, ¶36.

When the indicator bit in the Broadcast Channel BCH does indicate the presence of the FACH channel, as shown in Fig. 5, the UEs follow the normal procedure for reading and decoding the FACH. *See* Ex.1001, 12:17-23. “If there is a FACH message, the UE 430 is able to read the contents of the FACH channel, and determine whether, or not, the message is intended for itself.” Ex.1001, 10:47-49. “Upon reading a set FACH indicator bit, the UE 430 determines that the NODE B 430 is transmitting a FACH message, and ... is able to decode the FACH message.” Ex.1001, 12:17-21. “If the identity of the UE 430 matches the identity transmitted within the FACH message, the UE 430 acts on the message content.” Ex.1001, 12:21-23; Ex.1003, ¶37.

For the reasons explained below, however, the purported novelty of the ’416 patent was already well known. The references cited in this Petition disclose using

indicator bits in the broadcast channel to indicate whether a particular time slot is to be used as a signaling channel (e.g., FACH or PCH) or as a shared channel (e.g., HS-DSCH). Ex.1003, ¶¶32-38.

VI. PROSECUTION HISTORY OF THE '416 PATENT

The '416 patent was filed as U.S. Application No. 15/611,309 on June 1, 2017, but claims priority, through a series of continuations, to U.S. Patent Application No. 11/863,205 filed September 27, 2007. The Examiner allowed the claims as originally presented without comment. Ex.1002, 19-23, 55-61. The '416 patent issued November 20, 2018. Ex.1003, ¶¶39-40.

VII. PRIORITY DATE OF THE '416 PATENT

The earliest possible priority date of the '416 patent is September 27, 2007. Determining whether the '416 patent is entitled to this date is unnecessary in this proceeding as all of the relied-upon prior art predates September 27, 2007. Petitioner does not waive any right or opportunity to dispute the priority date of the '416 patent in this or another forum where the issue is relevant.

VIII. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art ("POSITA") in September 2007 would have had a working knowledge of the wireless communication arts that are pertinent to the '416 patent. A POSITA would have had a bachelor's degree from an accredited program in electrical engineering, computer engineering, or an

equivalent, and approximately two years of professional experience relating to wireless communication technology. Lack of professional experience can be remedied by additional education, and vice versa. Ex.1003, ¶19-21.

IX. CLAIM CONSTRUCTION

Claim terms in IPR are construed according to their “ordinary and customary meaning” to those of skill in the art. 37 C.F.R. § 42.100(b). Petitioner submits that, for the purposes of this proceeding and the grounds presented herein, no claim term requires express construction. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). Ex.1003, ¶41.

X. RELIEF REQUESTED AND THE REASONS FOR THE REQUESTED RELIEF

Petitioner asks that the Board institute an IPR trial and cancel the Challenged Claims in view of the analysis below.

XI. IDENTIFICATION OF HOW THE CLAIMS ARE UNPATENTABLE

A. Challenged claims

Petitioner challenges claims 1-12 of the '416 patent.

B. Statutory grounds for challenges

Grounds	Claims	Basis (pre-AIA)
#1	1-12	35 U.S.C. § 103 over Kim in view of Vayanos
#2	1-12	35 U.S.C. § 103 over Kim in view of Vayanos and Applicant Admitted Prior Art (AAPA)

U.S. Patent No. 8,761,814 to Kim et al. (“Kim”) entered the national stage in the U.S. on October 23, 2008 from a PCT application filed on April 24, 2007. The PCT application (Ex.1008) was published in English and designated the United States. Accordingly, Kim is prior art under at least 35 U.S.C. § 102(e).

U.S. Patent No. 8,144,735 to Vayanos et al. (“Vayanos”) was filed on February 9, 2005 and issued on March 27, 2012. Vayanos is thus prior art under at least 35 U.S.C. § 102(e).

Ground 2 relies on AAPA in the background of the ’416 patent to confirm that the teachings of Kim and Vayanos were known prior art. As such, the AAPA is not the basis for Ground 2, consistent with USPTO guidance on AAPA. *See generally* Ex.1016.

Kim and Vayanos were not considered during prosecution of the ’416 patent.

Petitioner’s obviousness grounds rely on the combined teachings of the references and not on a physical incorporation of elements. *See In re Mouttet*, 686 F.3d 1322, 1332 (Fed. Cir. 2012); Ex.1003, ¶42-44.

Petitioner also cites below to additional prior art as evidence of the background knowledge of a POSITA and to provide contemporaneous context to support Petitioner’s assertions regarding what a POSITA would have understood from the prior art in the grounds. *See Yeda Research v. Mylan Pharm. Inc.*, 906

F.3d 1031, 1041-1042 (Fed. Cir. 2018) (affirming the use of “supporting evidence relied upon to support the challenge”); 37 C.F.R. § 42.104(b).

C. Ground 1: Claims 1-12 are obvious over Kim and Vayanos.

As explained above, the '416 patent seeks to utilize radio resources (e.g., a timeslot and frequency) more efficiently. Rather than broadcasting a signaling channel (e.g., a PCH or FACH) within each frame, the '416 patent seeks to place the signaling channel into a frame only when needed. As stated in the '416 patent, “it is desirable for the timeslot 310 assigned to the FACH to be able to be used for other purposes when it is not required for the transmission of FACH messages.” Ex.1001, 3:61-65.

The purported solution to this problem is to use indicator bits within the Broadcast Channel BCH to indicate to the terminals whether a particular timeslot is to be used as a signaling channel (for paging) or a shared channel (for data). “[T]he indicator bits are used to inform the UE whether it should be reading the resources ‘reserved’ for FACH as a FACH channel, or whether it should be ignoring those resources (for example when they are being used for another channel such as HS-DSCH).” Ex.1001, 9:53-58. This purported solution is recited, for example, in limitation [1.2] of claim 1: “*wherein each of the plurality of bits indicates a respective time interval that physical shared channel resources are utilized to signal channels.*”

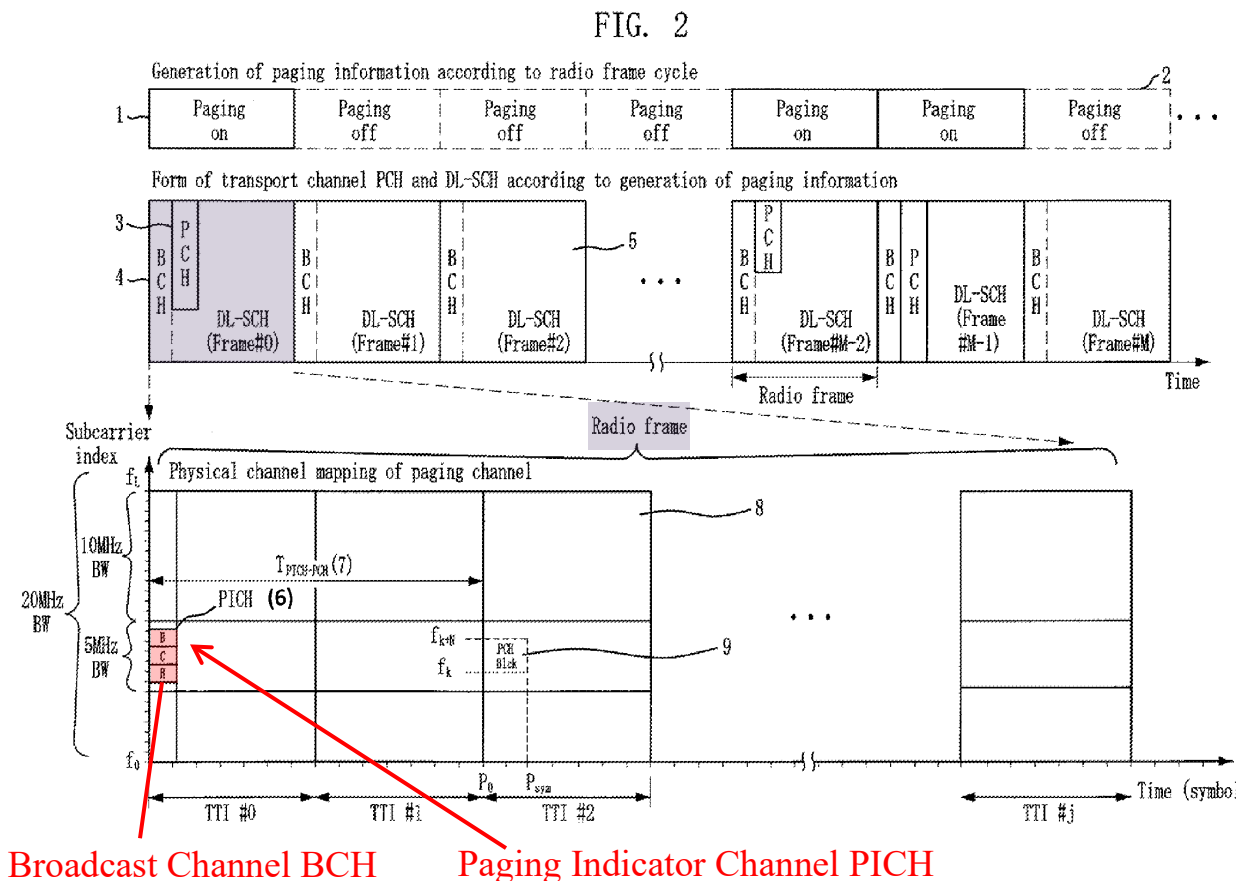
However, Kim (Ex.1005) shows that it was already known to use bits within the broadcast channel to indicate whether radio resources are being used as shared channels (for data) or as signal channels (for paging). “When no paging information is generated (see 2 of FIG. 2), the paging channel does not exist in the transport channel of the radio frame (see 5 of FIG. 2).” Ex.1005, 5:13-17. “Therefore, downlink shared channel (DL-SCH) information for user data transmission and not paging information of the paging channel is transmitted to the radio resource block location of the physical layer fixed and allocated for the paging channel.” Ex.1005, 5:17-21. Ex.1003, ¶¶32-38; 45-54.

1. Summary of Kim

Like the '416 patent, Kim “relates to a method for transmitting paging information in a cellular system.” Ex.1005, 1:6-8. Kim identifies the same problem described in the '416 patent—wasted radio resources. *See* Ex.1005, 1:34-37. As explained above, the '416 patent states that “timeslots reserved for FACH transmissions could be utilised for a traffic channel during periods when no FACH transmissions were required to be sent.” Ex.1001, 3:67-4:3. Kim describes the same problem—when there is no information to be sent in a signaling channel (e.g., a Paging Channel PCH), “radio resource[s], i.e., power, are allocated and thus radio resources are wasted.” Ex.1005, 1:34-37; Ex.1003, ¶45. Kim solves this problem in the same way described and claimed in the '416 patent—by using

indicator bits in the Broadcast Channel BCH to indicate whether a particular time slot will be used as a signaling channel (e.g., a Paging Channel PCH) or as a downlink shared channel. See Ex.1005, 4:36-5:21; Ex.1003, ¶45.

Fig. 2 of Kim illustrates a series of radio frames (Frame#0-Frame#M) sent to a UE by the base station. The bottom portion of Fig. 2 illustrates a single frame (Frame#0) (purple) in more detail, with paging indicator channel PICH 6 (red) embedded within in the Broadcast Channel (BCH). Ex.1003, ¶46.

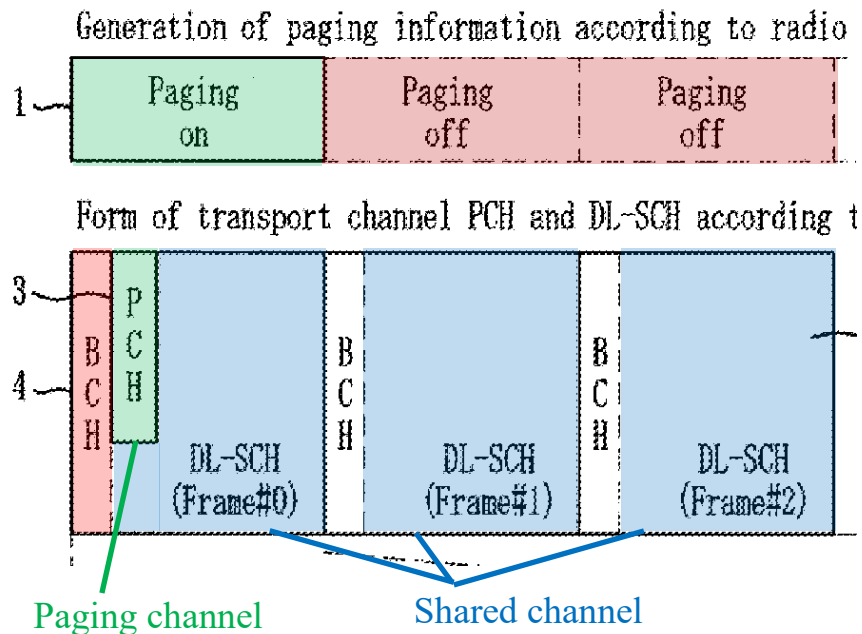


Ex.1005, Fig. 2 (annotated); Ex.1003, ¶46.

Kim describes its Paging Indication Channel (PICH) consistent with known

paging procedures: “[T]he base station sets up a paging indication channel 6 corresponding to the terminal or the terminal group indicated by the paging information and forms the paging indication channel 6.” Ex.1005, 4:58-61. The base station schedules the PICH within the broadcast channel: “The scheduler performs scheduling on broadcasting channel (BCH) information, created paging channel information ... to be transmitted to the terminal.” Ex.1005, 4:53-56. “[P]aging information is transmitted to the terminals in the RRC Idle state through the paging indication channel [PICH], which is a physical channel.” Ex.1005, 4:42-45; Ex.1003, ¶47.

Referring back to Fig. 2, the top portion illustrates whether paging information for a particular frame is ON (green) or OFF (red), and if paging is ON for a particular frame, a PCH (green) is transmitted within the frame. Ex.1005, 4:48-52; Ex.1003, ¶48.



Ex.1005, Fig. 2 (partial); Ex.1003, ¶49.

As shown in the example of Fig. 2 above, paging is ON for Frame#0 and thus the Paging Channel (PCH) is included within the frame. In Frame#1 and Frame#2, however, the paging indication is OFF and thus no paging channel is included within the frame. Ex.1003, ¶50. Kim explains that “[w]hen no paging information is generated (see 2 of FIG. 2), the paging channel does not exist in the transport channel of the radio frame (see 5 of FIG. 2). In this case, the paging indication channel is not also set up.” Ex.1005, 5:13-18. In other words, because the PCH is not needed, it is not scheduled and thus does not waste resources. Ex.1003, ¶50.

When the paging information is OFF, the radio resources can instead be used for a downlink shared channel DL-SCH. See Ex.1005, 5:9-21. “Therefore,

downlink shared channel (DL-SCH) information for user data transmission and not paging information of the paging channel is transmitted to the radio resource block location of the physical layer fixed and allocated for the paging channel.” Ex.1005, 5:13-17. Kim thus explains that its teachings “improve 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 down link information from a base station to a terminal in a cellular system for packet transmission.” Ex.1005, 2:51-61; Ex.1003, ¶¶51-52.

Kim also describes the conventional operation of the Paging Channel PCH in which a terminal will monitor the PICH and decode the PCH when it is determined there is a message for itself. Ex.1005, 1:43-52. “The terminals monitor the paging indication channel [PICH] every monitoring cycle.” Ex.1005, 1:43-45. When the indication bits in the PICH indicate to a group of terminals that there is paging information for one of those terminals, each terminal in the paging group will then check the PCH: “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 ... and decode paging information.” Ex.1005, 1:45-50. Each terminal in the indicated paging group checks the PCH for its particular “identifier (ID) such as international mobile subscriber identity (IMSI), temporary mobile subscriber identity (TMSI), UMTS terrestrial radio

access network-radio network temporary identifier (U-RNTI).” Ex.1005, 1:49-52.

The terminals decoding the paging information performs following procedures corresponding to the paging information. Ex.1003, ¶53.

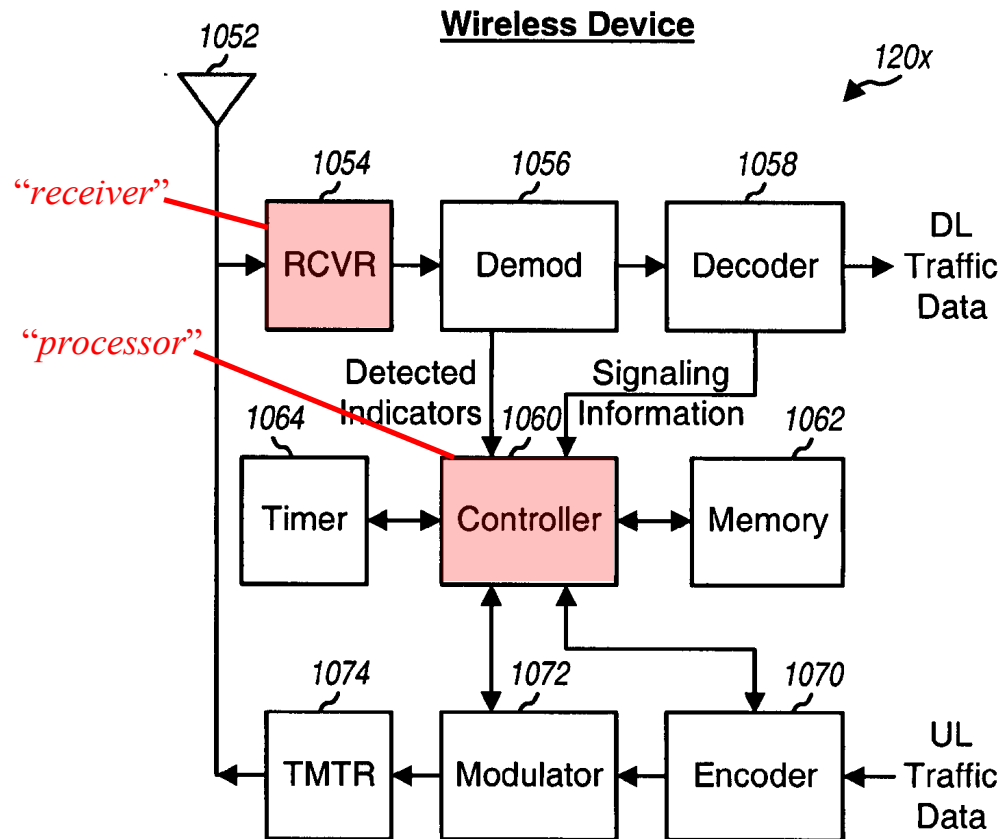
Accordingly, Kim describes the same solution to the same problem identified in the ’416 patent—using indicator bits in the broadcast channel to indicate whether to use radio resources as a signaling channel (e.g., PCH) or a shared channel (e.g., DL-SCH). Ex.1003, ¶54.

Kim is analogous art to the ’416 patent because it is directed to the same field of endeavor (cellular communication systems according to the 3GPP standard) as the ’416 patent. *Compare* Ex.1001, 1:25-28 (“cellular communication systems, such as a Universal Mobile Telecommunications System (UMTS) Radio Access Network (UTRAN), standardised by the 3rd Generation Partnership Project (3GPP).”) *with* Ex.1005, 3:42-46 (“A 3rd Generation Partnership Project (3GPP) long term evolution (LTE) system, which is being standardized as the cellular system for the packet service.”). In addition, Kim describes efficient paging procedures that are reasonably pertinent to the problem purportedly solved by the ’416 patent. *See* Ex.1005, 1:34-37. The ’416 patent likewise purports to address efficient use of resources. *See* Ex.1001, 3:58-61 (using a signaling channel when not needed “is an inefficient use of physical resources.”).

2. Summary of Vayanos

Like Kim and the '416 patent, Vayanos “relates generally to communication, and more specifically to techniques for transmitting signaling information for broadcast ... services in a communication system.” Ex.1006, 1:17-20.

Vayanos describes additional details about the terminal hardware, such as the receiver and processor. Ex.1006, 12:12-64. With reference to Fig. 10 below, Vayanos describes a “wireless device 120x” in which “an antenna 1052 receives the downlink signal from base station 110x and provides a received signal to a receiver unit (RCVR) 1054.” Ex.1006, 12:12-24. The wireless device also includes a controller 1060 that “perform[s] various functions for transmission and reception, respectively, of notification indicators and signaling information for the services.” Ex.1006, 12:12-24. Vayanos explains that “the processing units used to transmit signaling information may be implemented within one or more application specific integrated circuits (ASICs), digital signal processors (DSPs), digital signal processing devices (DSPDs), programmable logic devices (PLDs), field programmable gate arrays (FPGAS), processors, controllers, micro-controllers, microprocessors.” Ex.1006, 12:49-64; Ex.1003, ¶55-56.



Ex.1006, Fig. 10 (partial); Ex.1003, ¶56.

Vayanos also illustrates that it was known for the Paging Indicator Channel PICH to include a plurality of bits: "FIG. 2B shows the format of one frame for the PICH. Each PICH frame includes 300 bits, which are labeled as bits b_0 through b_{299} ." Ex.1006, 3:26-28; Ex.1003, ¶¶57-58.

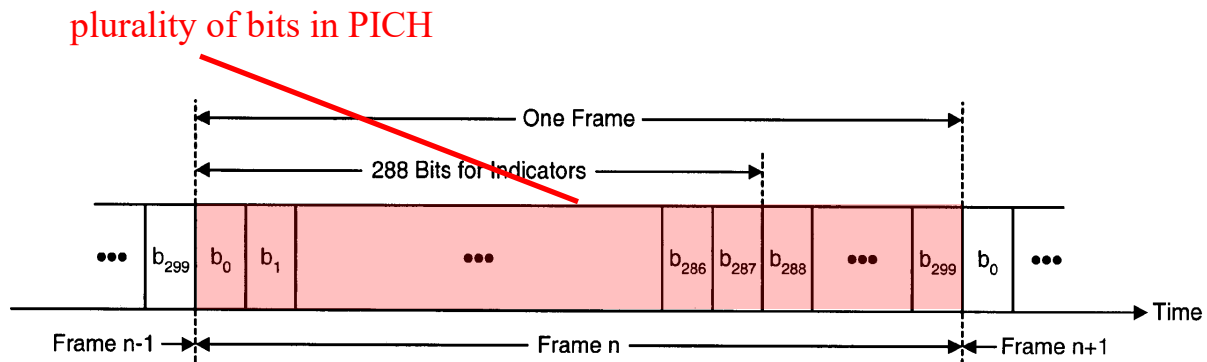


FIG. 2B

Ex.1006, Fig. 2B (annotated); Ex.1003, ¶58.

Accordingly, Vayanos provides examples of known paging techniques and the known format for various aspects of standardized frames, which include a PICH having a plurality of bits. Ex.1003, ¶59.

Vayanos is analogous art to the '416 patent because it is directed to the same field of endeavor (cellular communication systems according to the 3GPP standard) as the '416 patent. *Compare* Ex.1001, 1:25-28 ("cellular communication systems, such as a Universal Mobile Telecommunications System (UMTS) Radio Access Network (UTRAN), standardised by the 3rd Generation Partnership Project (3GPP)") *with* Ex.1006, 2:46-50 ("UMTS is a system that uses W-CDMA and/or GSM as radio access technologies and is described in documents from a consortium named '3rd Generation Partnership Project' (3GPP)"). In addition, Vayanos describes paging procedures that are reasonably pertinent to the problem purportedly solved by the '416 patent. *See* Ex.1006, 3:26-28. The '416 patent

likewise purports to address efficient use of resources. *See* Ex.1001, 3:58-61 (using a signaling channel when not needed “is an inefficient use of physical resources.”).

3. Reasons to Combine Kim and Vayanos

A POSITA would have found it obvious for Kim’s paging process to use standardized techniques such as those taught by Vayanos. Ex.1003, ¶60. For example, it would have been obvious for Kim’s Paging Indicator Channel PICH to include a plurality of bits consistent with the known implementation of the PICH as evidenced by Vayanos. Ex.1003, ¶60.

A POSITA would have found it obvious for Kim’s paging technique to be consistent with known 3GPP paging techniques, because Kim is directed to cellular communication systems that follow 3GPP standards. *See* Ex.1005, 3:42-46; Ex.1003, ¶61. Vayanos provides additional details about known 3GPP paging techniques, such as the format of the PICH. It would have thus been obvious for Kim’s paging techniques to use known 3GPP paging techniques such as the known format of the PICH, as taught by Vayanos, as a conventional implementation detail for implementing the 3GPP standards. Ex.1003, ¶61.

In more detail, Kim describes a known method for “setting a **paging indication channel (PICH)** based on the paging information and forming the paging indication channel in a radio resource of a physical layer.” Ex.1005, 2:34-37. Kim further explains that “the base station sets up a paging indication channel

6 corresponding to the terminal or the terminal group indicated by the paging information and forms the paging indication channel 6 at step S140 such that the terminal in the system can be divided into groups.” Ex.1005, 4:58-63, Fig. 1.

“[P]aging information is transmitted to the terminals in the RRC Idle state through the paging indication channel.” Ex.1005, 4:42-45; Ex.1003, ¶62.

Vayanos similarly describes a paging indicator channel PICH with the same functionality. “In UMTS, a Page Indicator Channel (PICH) is used to send paging indicators to idle wireless devices.” Ex.1006, 2:56-57. “The paging indicators for each idle wireless device indicate whether messages might be sent on a Paging Channel (PCH) for the wireless device.” Ex.1006, 2:62-65; Ex.1003, ¶63.

Vayanos also provides additional implementation details for the PICH including a known formatting technique for the PICH. “FIG. 2B Shows the format of one frame for the PICH. Each PICH frame includes 300 bits, which are labeled as bits b_0 through b_{299} .” Ex.1006, 3:26-28. The indicator bits within a PICH frame are shown below.

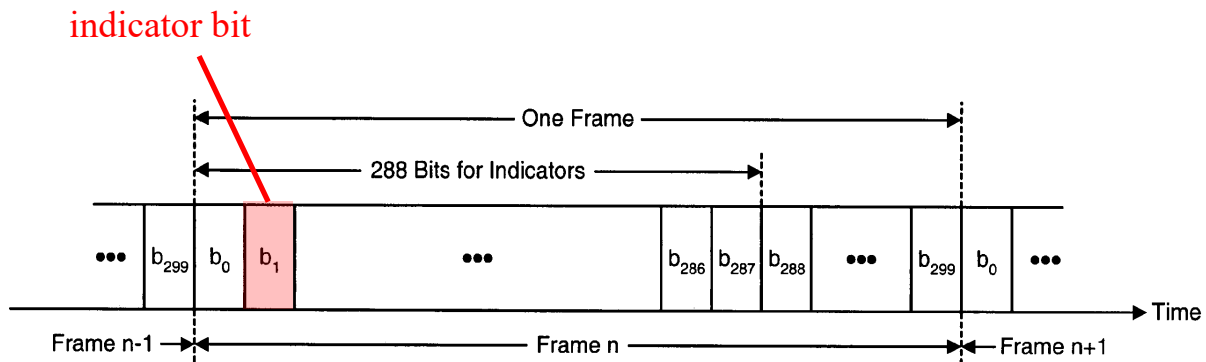


FIG. 2B

Ex.1006, Fig. 2B (annotated); Ex.1003, ¶64.

A POSITA would have found it obvious for Kim’s PICH to be implemented consistent with Vayanos’s format because doing so would have been a matter of implementing the PICH according to 3GPP standards. *See, e.g., Samsung Electronics Co., Ltd. et al. v. Netlist Inc.*, IPR2023-00455 Paper 30, 33 (PTAB July 30, 2024) (finding obviousness of implementing according to known standards: “Given JEDEC as the standard, an ordinarily skilled artisan would have reason to pursue such a known option”); Ex.1003, ¶65. Vayanos explains that “**UMTS** is a system that uses W-CDMA and/or GSM as radio access technologies and is described in documents from a consortium named ‘3rd Generation Partnership Project’ (3GPP).” Ex.1006, 2:46-49. Vayanos further explains that “[i]n **UMTS**, a Page Indicator Channel (PICH) is used to send paging indicators to idle wireless devices.” Ex.1006, 2:56-57. Kim similarly relates to a UMTS system. *See* Ex.1005, 1:38-55; Ex.1003, ¶65.

A POSITA would have found it beneficial to implement all aspects of the base stations and terminals according to known standards to ensure compatibility and marketability of the product. Ex.1003, ¶66. Moreover, a POSITA would have found it beneficial and advantageous to implement such devices with standardized techniques that have already been well vetted and tested for workability. Ex.1003, ¶66. Indeed, the combination is nothing more than “the predictable use of prior art elements according to their established functions.” *See KSR Int’l v. Teleflex Inc.*, 550 U.S. 398, 417 (2007).

Accordingly, the combination of Kim and Vayanos represents combining prior art elements (Kim and Vayanos’s paging procedures) according to known methods (3GPP paging procedures) to yield predictable results (paging specific groups of terminals based on specific bits within the PICH). The combination of Kim and Vayanos also represents applying a known technique (a PICH with a plurality of bits as taught by Vayanos) to a known method (Kim’s paging procedure that uses a PICH) ready for improvement to yield predictable results (paging specific groups of terminals based on specific bits within the PICH). Ex.1003, ¶69.

A POSITA would have had a reasonable expectation of success because the PICH performs the same function in Kim as it does in Vayanos—paging specific groups of terminals. Ex.1003, ¶67. “In UMTS, a Page Indicator Channel (PICH) is

used to send paging indicators to idle wireless devices.” Ex.1006, 2:56-57. “The terminals monitor the paging indication channel every monitoring cycle.” Ex.1005, 1:43-45; Ex.1003, ¶67.

A POSITA also would have had a reasonable expectation of success because both Kim and Vayanos are directed to cellular communication systems that follow 3GPP standards. *See* Ex.1005, 3:42-46 (“A 3rd Generation Partnership Project (3GPP) long term evolution (LTE) system, which is being standardized as the cellular system for the packet service”); Ex.1006, 2:46-50 (“UMTS is a system that uses W-CDMA and/or GSM as radio access technologies and is described in documents from a consortium named ‘3rd Generation Partnership Project’ (3GPP)”). Accordingly, both Kim and Vayanos describe known methods according to 3GPP standards. Ex.1003, ¶68.

4. Claim 1

[1.0] *A user equipment (UE) comprising:*

Kim renders obvious limitation [1.0]. Ex.1003, ¶¶70-72.

Kim describes “a method for transmitting paging information ... from a base station **to a terminal**” (“*user equipment (UE)*”) in a cellular system. Ex.1005, 1:5-10; Ex.1003, ¶70. As was known in the art, a “terminal” “may also be called a user equipment (UE).” Ex.1006, 2:23-25; Ex.1003, ¶71.

Thus, because Kim relates to transmitting information from a base station to

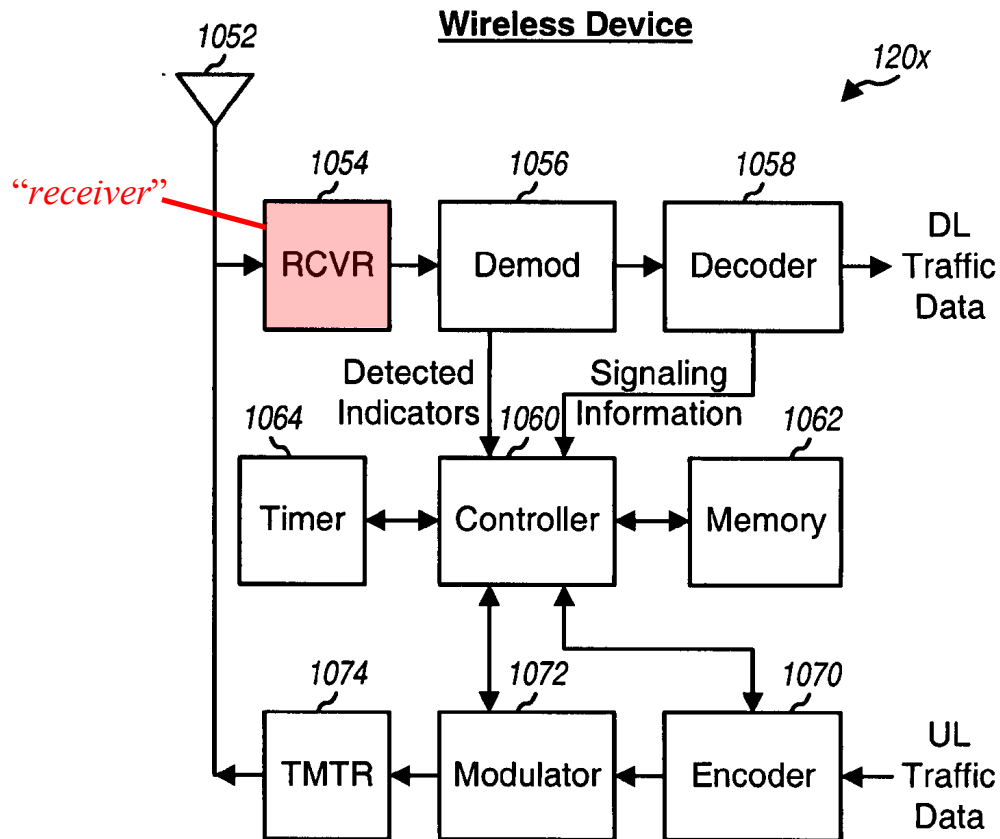
a terminal, and a terminal was also known in the art to be a user equipment (UE), Kim renders obvious “[a] user equipment (UE).” Ex.1003, ¶¶70-72.

[1.1] a receiver, the receiver configured to receive broadcast information including a plurality of bits,

Kim and Vayanos render obvious limitation [1.1.]. Ex.1003, ¶¶73-88.

First, Kim’s terminal includes a “receiver” because it receives information transmitted from a base station. Ex.1005, 1:5-10 (“a method for transmitting paging information notifying generation of downlink **information from a base station to a terminal** in a cellular system for providing a packet service.”); Ex.1003, ¶73.

To the extent it is argued that Kim does not expressly disclose that its terminal includes a receiver, it was well-known that UEs such as Kim’s terminal includes a receiver, as shown by Vayanos. Accordingly, Kim and Vayanos render obvious a *receiver* as claimed. Ex.1003, ¶74. Vayanos describes a standard UE, like Kim’s, that receives information from a base station: “At wireless device 120x, an antenna 1052 receives the downlink signal from base station 110x and provides a received signal to **a receiver unit (RCVR) 1054**.” Ex.1006, 12:12-24. “Receiver unit 1054 conditions (e.g., filters, amplifies, and frequency down converts) the received signal, digitizes the conditioned signal, and provides data samples.” Ex.1006, 12:12-24; Ex.1003, ¶74.



Ex.1006, Fig. 10 (partial, annotated); Ex.1003, ¶74.

Accordingly, because Kim’s terminal receives radio transmissions, it would have been obvious for Kim’s terminal to include a receiver, as evidenced by Vayanos. While a POSITA would have recognized that Kim’s terminal inherently included a receiver because Kim’s terminal receives radio transmissions, a POSITA would have also found it obvious for Kim’s terminal to include a receiver as taught by Vayanos. Ex.1003, ¶75.

Kim describes a mobile terminal that receives and decodes information. For example, a terminal receives paging information from the base station: “The

terminals monitor the paging indication channel every monitoring cycle.” Ex.1005, 1:43-45. The terminal also decodes that information: “[W]hen 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 paging information.” Ex.1005, 1:45-50.

Vayanos similarly describes a terminal that receives and decodes information.

“Each idle wireless device monitors the PICH for its paging indicators.” Ex.1006, 2:66-67. “If these paging indicators are set to ‘1’, then the wireless device processes the S-CCPCH to look for any messages sent for the wireless device.”

Ex.1006, 2:67-3:2. The S-CCPCH includes the Paging Channel PCH: “The PCH is a transport channel that is carried in a Secondary Common Control Physical Channel (S-CCPCH).” Ex.1006, 2:64-66; Ex.1003, ¶76.

Vayanos’s terminal predictably performs these receiving functions with a receiver, as explained above at Section XI.C.2. Vayanos describes a “wireless device 120x” in which “an antenna 1052 receives the downlink signal from base station 110x and provides a received signal to a receiver unit (RCVR) 1054.” Ex.1006, 12:12-24. Ex.1003, ¶77.

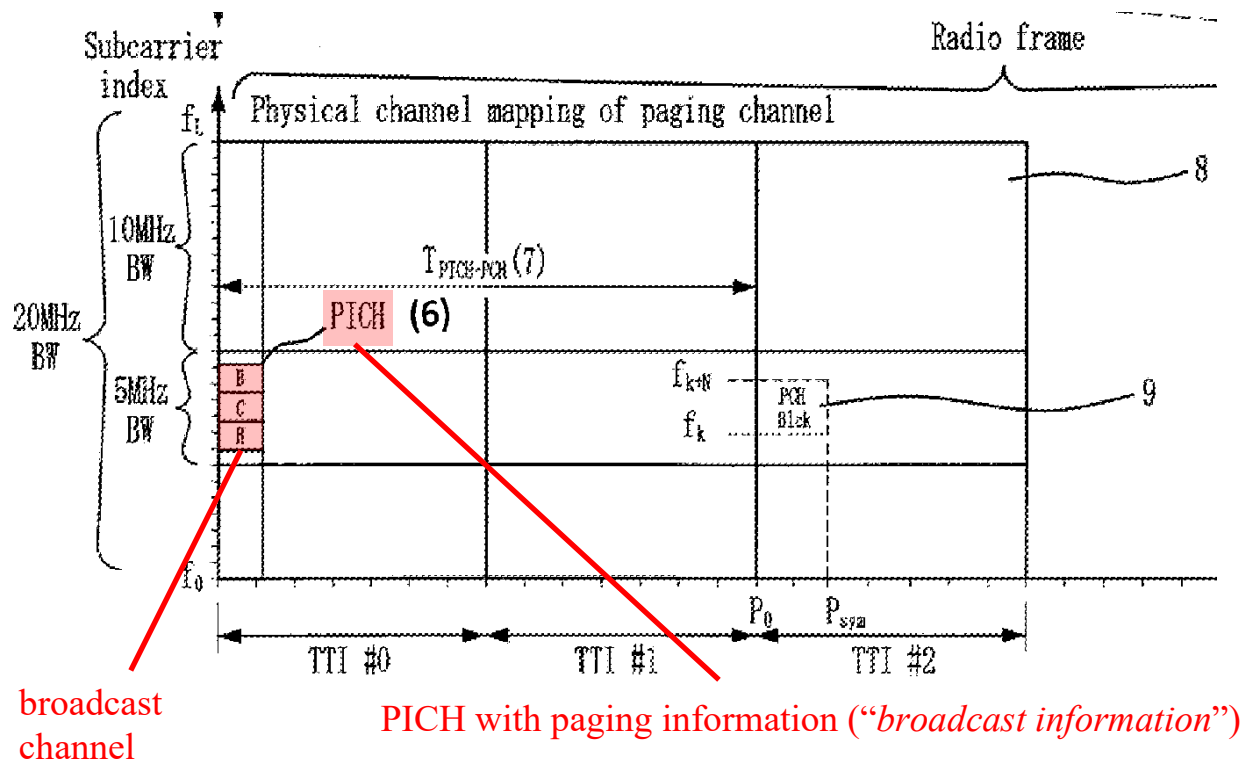
A POSITA would have found it obvious for Kim’s terminal to similarly include a receiver. Ex.1003, ¶78. Because Kim’s terminal receives radio transmissions, it would have been obvious—if not inherent—for the terminal to

include a receiver, as taught by Vayanos. Ex.1003, ¶78. Doing so would achieve the predictable result of Kim's terminal receiving radio transmissions through a receiver and processing the received information with a processor. Ex.1003, ¶78.

Accordingly, the combination of Kim and Vayanos merely represents combining prior art elements (Kim's terminal having a receiver, as taught by Vayanos) according to known methods (providing a terminal with a receiver, as taught by Vayanos) to yield predictable results of configuring a wireless terminal with a receiver. The combination also represents applying a known technique (implementing a terminal with a receiver as taught by Vayanos) to a known device (Kim's terminal) ready for improvement to yield predictable results (receiving transmissions with the receiver and processing received data with the processor). Ex.1003, ¶79.

Second, the receiver in Kim's terminal receives paging information ("*broadcast information*") through a Paging Indication Channel PICH: "In the present embodiment, **paging information is transmitted to the terminals in the RRC Idle state through the paging indication channel**, which is a physical channel." Ex.1005, 4:42-57; Ex.1003, ¶80.

The paging information is "*broadcast*" information because the Paging Indication Channel PICH is part of the Broadcast Channel BCH, as shown below in Fig. 2. Ex.1005, Fig. 2; Ex.1003, ¶81.



Ex.1005, Fig. 2 (partial, annotated); Ex.1003, ¶81.

Accordingly, the paging information in the PICH is “*broadcast information*” Ex.1003, ¶82.

Third, it was known in the art that the PICH (“*broadcast information*”) is structured as “*a plurality of bits*,” as illustrated by Vayanos: “FIG. 2B shows the format of one frame for the PICH. Each **PICH frame includes 300 bits**, which are labeled as bits b_0 through b_{299} . The first 288 bits are used for N_p **paging indicators**.” Ex.1006, 3:26-45; Ex.1003, ¶83.

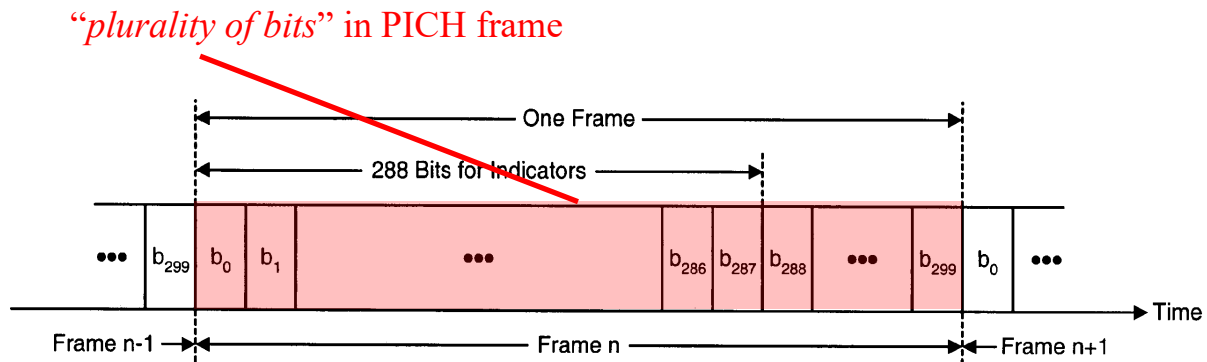
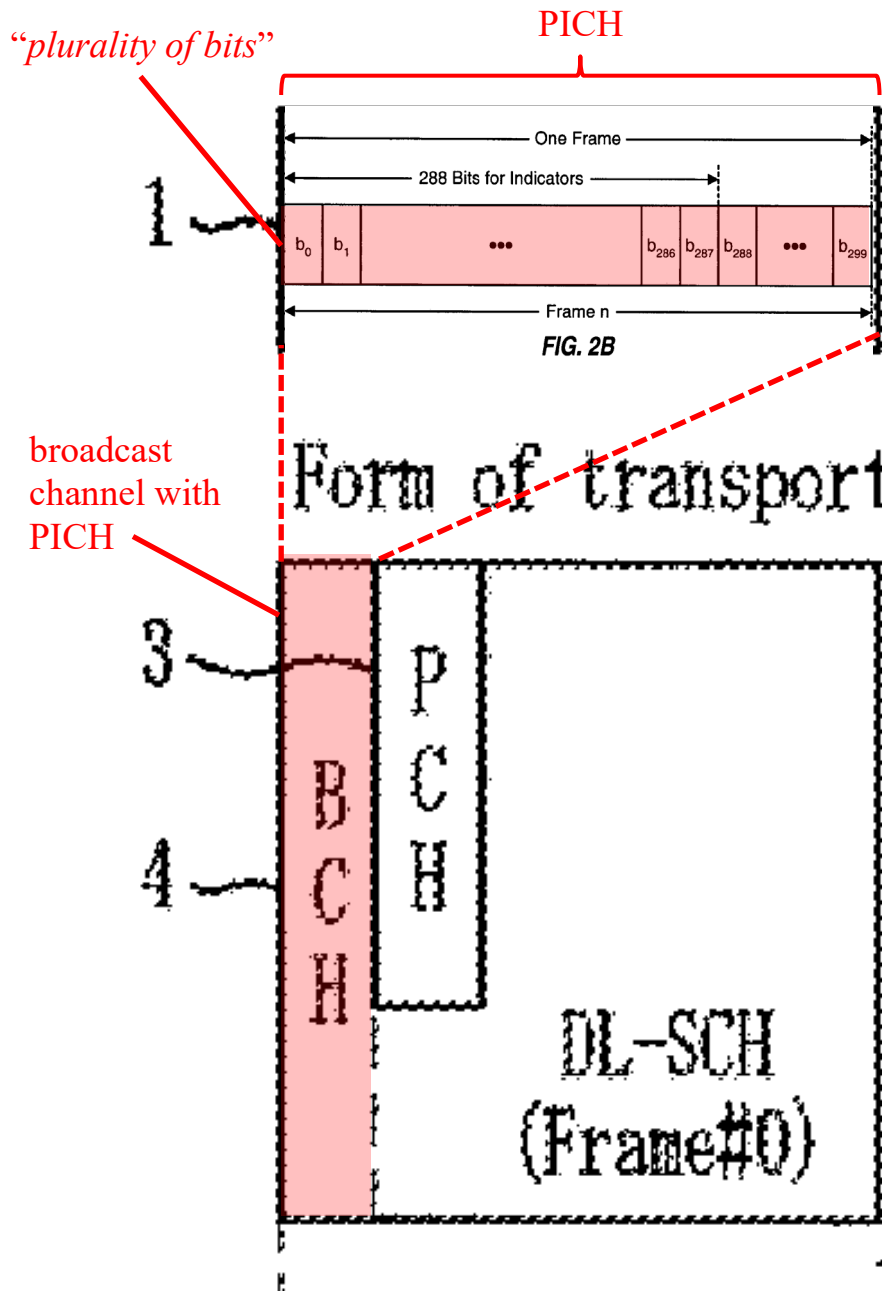


FIG. 2B

Ex.1006, Fig. 2B (annotated); Ex.1003, ¶85.

These bits are referred to as “paging indicators.” Ex.1006, 3:26-45. “The paging indicators for each idle wireless device indicate whether messages might be sent on a Paging Channel (PCH) for the wireless device.” Ex.1006, 1:62-65. Ex.1003, ¶84.

As explained above, the PICH is part of the broadcast channel in each frame. Accordingly, for each frame received by Kim’s terminal, the PICH within the broadcast channel would include the plurality of bits illustrated in Fig. 2B of Vayanos. Ex.1003, ¶86. Dr. Ding has annotated Vayanos’s Fig. 2B and Kim’s Fig. 2 together to illustrate this concept.



Ex.1006, Fig. 2B and Ex.1015, Fig. 2 (partial, annotated); Ex.1003, ¶86.

Additionally, a POSITA would have understood based on background knowledge—evidenced by the Holma textbook (Ex.1015)—that a PICH includes multiple bits. *See* Ex.1015, 131-132 (“Each PICH frame carries 288 bits to be used

by the paging indicator bit.”); Ex.1003, ¶87.

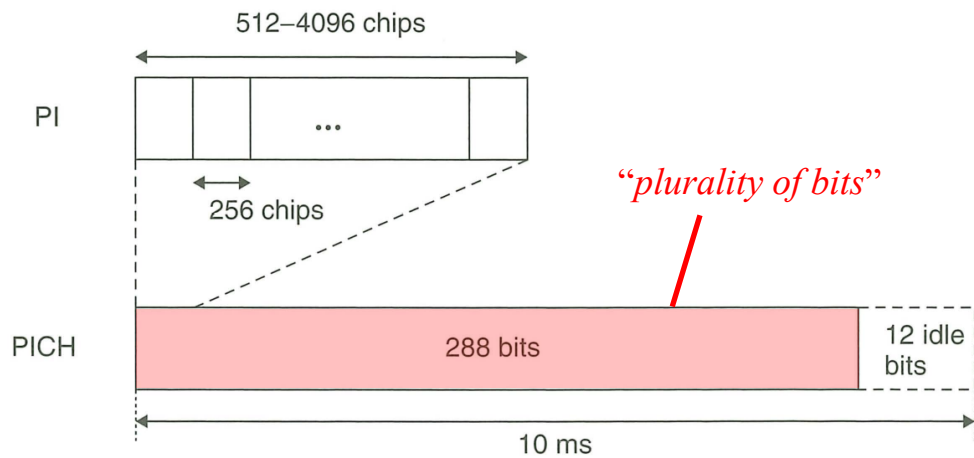


Figure 6.23. PICH structure with different PI repetition rates

Ex.1015, Fig. 6.23 (annotated); Ex.1003, ¶87.

Thus, Kim’s disclosure of a terminal receiving paging information within a paging indicator channel (PICH) in the broadcast channel, in view of Vayanos’s disclosure of a receiver in a terminal receiving the standard PICH with a plurality of indicator bits, renders obvious “a receiver, the receiver configured to receive broadcast information including a plurality of bits.” Ex.1003, ¶88.

[1.2] wherein each of the plurality of bits indicates a respective time interval that physical shared channel resources are utilized to signal channels; and

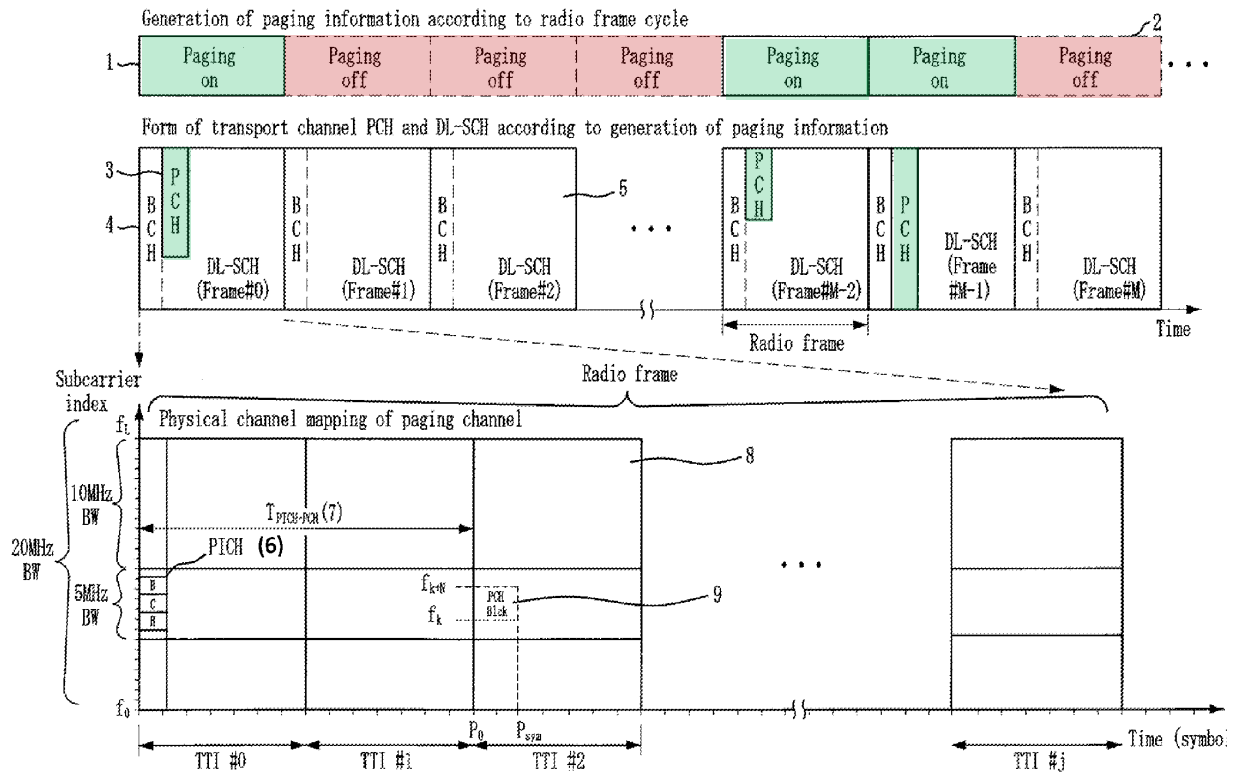
Kim discloses or at least renders obvious limitation [1.2]. Ex.1003, ¶89-100.

As explained above at [1.1], Kim’s frames include a Paging Indication Channel PICH with “paging information,” and Vayanos teaches that such PICH paging information comprises a plurality of “paging indicators” (“plurality of

bits”). Ex.1005, 4:48-52; Ex.1006, 3:26-45; Ex.1003, ¶89. Each of these paging indicators is associated with and indicates a respective time interval in which a Paging Channel PCH may be found—e.g., if a paging indicator for a UE is set to ON, the UE looks in a specific portion of the frame for the PCH. Ex.1003, ¶89 (*citing* Ex.1005, 1:38-55).

First, paging information (“*a plurality of bits*”) for each specific frame (“*respective time interval*”) indicates whether a PCH will be placed within that respective frame. In other words, if the PICH for a particular frame is ON, a PCH is included in that frame as shown below in Fig. 2. Ex.1005, 4:48-52 (“When paging information 1 on a terminal or a group of terminals at a predetermined time is generated at step S110, the base station has a paging channel (PCH) included in the transport channel.”); Ex.1003, ¶90.

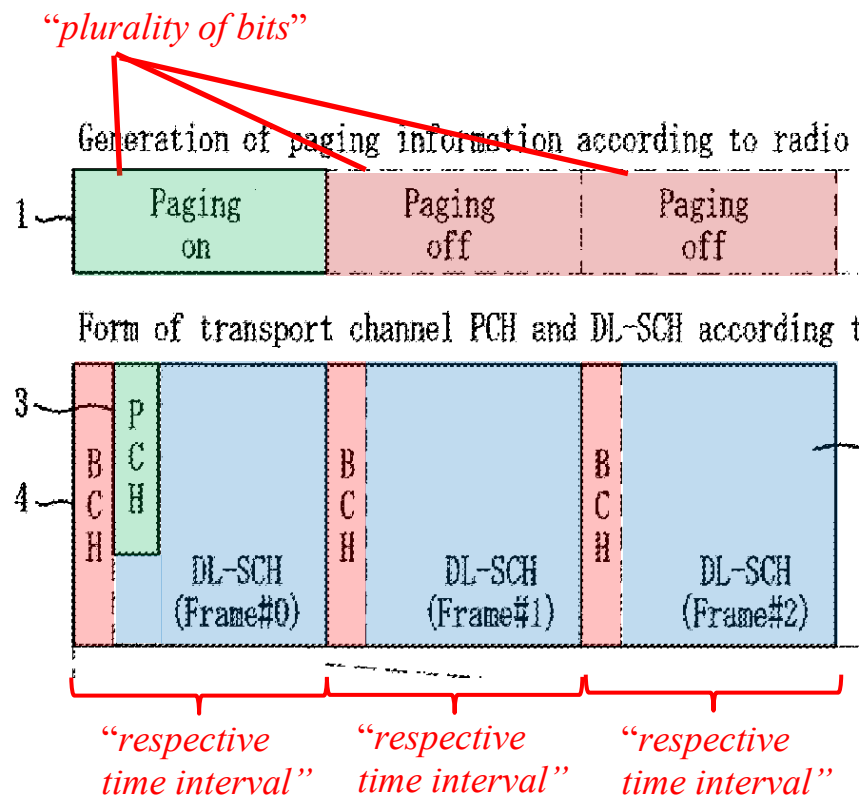
FIG. 2



Ex.1005, Fig. 2 (annotated); Ex.1003, ¶90.

As illustrated, each frame is a “*respective time interval*,” and the paging information for any particular frame indicates whether or not there will be a PCH within that frame. Each of these paging indicators is thus associated with and indicates a respective time interval in which a Paging Channel PCH will be found—e.g., if a paging indicator for a UE is set to ON, the UE looks in a specific frame (“*time interval*”) for the PCH. Ex.1003, ¶91 (citing Ex.1005, 1:38-55). In other words, if any of the bits of the paging information (“*each of the plurality of bits*”) are ON for a particular frame (“*respective time interval*”), there will be a

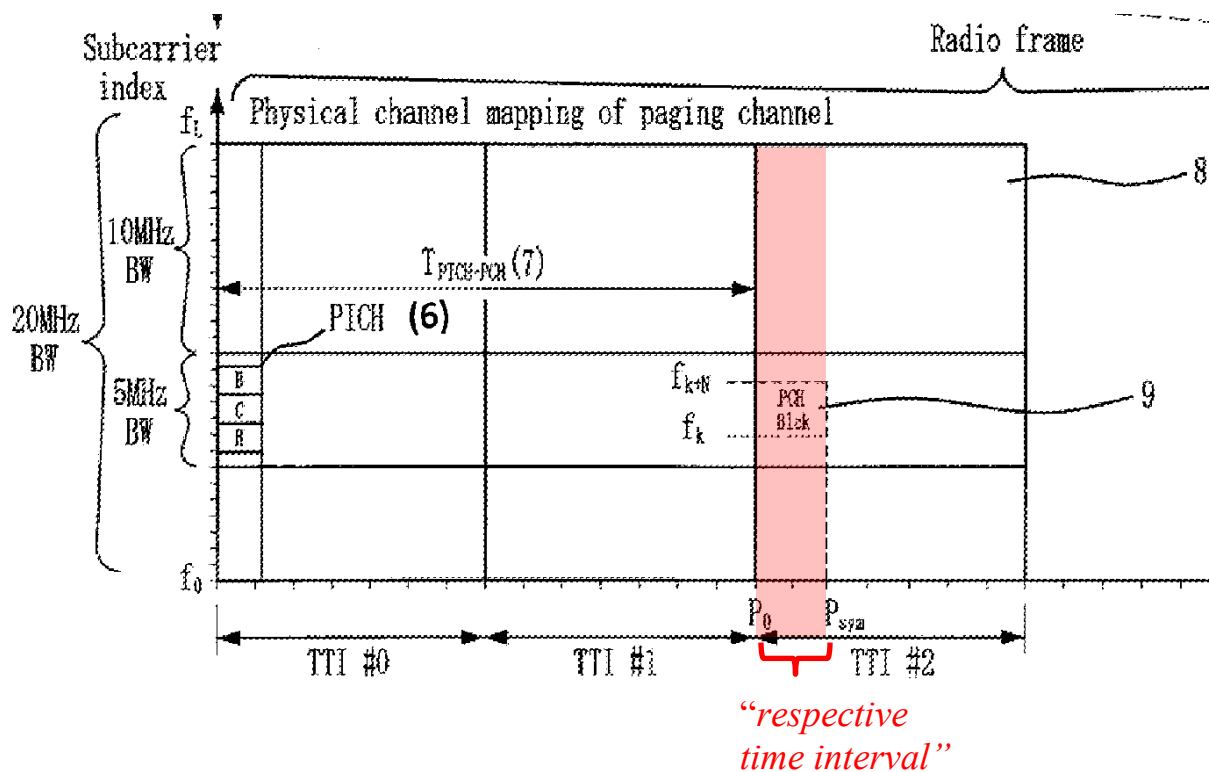
PCH within that frame as indicated by the paging information. *See* Ex.1005, 1:48-52. For example, because the paging information is on for Frame#0, there is a PCH within Frame#0. The paging information also indicates for Frame#1 and Frame#2 (“*respective time intervals*”) that there will be no PCH. Ex.1003, ¶91.



Ex.1005, Fig. 2 (partial, annotated); Ex.1003, ¶91.

In an alternative example, a specific Transmission Time Interval (TTI) within each frame is a “*respective time interval*,” and the paging information for each respective frame indicates whether that frame will include a signaling channel (e.g., PCH) at a specific TTI within that frame. Ex.1005, 4:64-6:8. Kim’s base

station determines the specific time interval for each frame based on a T_{paging} indication channel-PCH value 7.” “ $T_{\text{paging indication channel-PCH}}$ value is a parameter notifying a time difference between the paging indication channel and the TTI that the paging channel is transmitted. The $T_{\text{paging indication channel-PCH}}$ value is set up as a multiple TTI.” Ex.1005, 4:64-6:8; Ex.1003, ¶92.

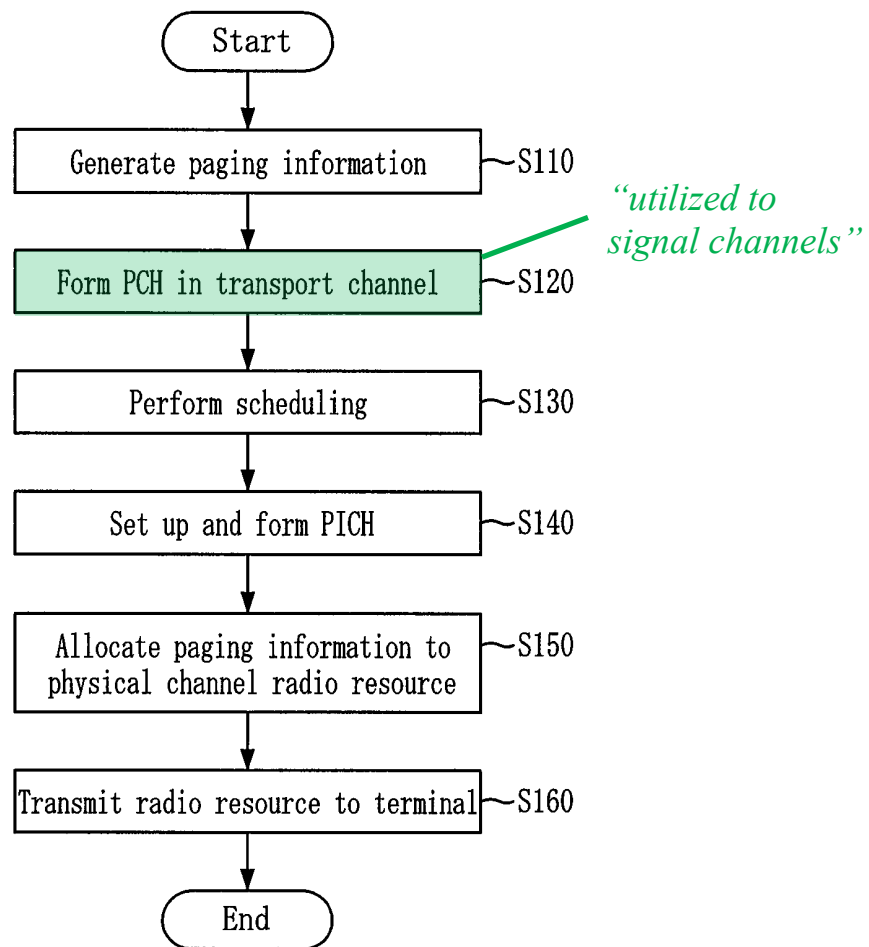


Ex.1005, Fig. 2 (partial, annotated); Ex.1003, ¶92.

Accordingly, for Frame#0, the paging information indicates that there will be a PCH within the frame. The bits in the paging information are thus associated with and indicate that at a respective time interval within that frame, a Paging Channel PCH may be found. Ex.1003, ¶93 (citing Ex.1005, 1:38-55). The UE will

then check TTI#2 (“*respective time interval*”) for the PCH. *See* Ex.1005, 4:64-5:9; Ex.1003, ¶93.

Second, the paging information (“*plurality of bits*”) in the PICH indicates “*that physical shared channel resources are utilized to signal channels.*” In particular, the paging information indicates whether resources within the respective time interval will be used as downlink shared channel DL-SCH resources (“*shared channel resources*”) or as a paging channel (“*utilized to signal channels*”). Ex.1005, 4:48-52, 5:8-21. Kim explains that “[w]hen paging information 1 on a terminal or a group of terminals at a predetermined time is generated at step S110, **the base station has a paging channel (PCH) included in the transport channel based on the generated paging information** at step S120.” Ex.1005, 4:48-52.

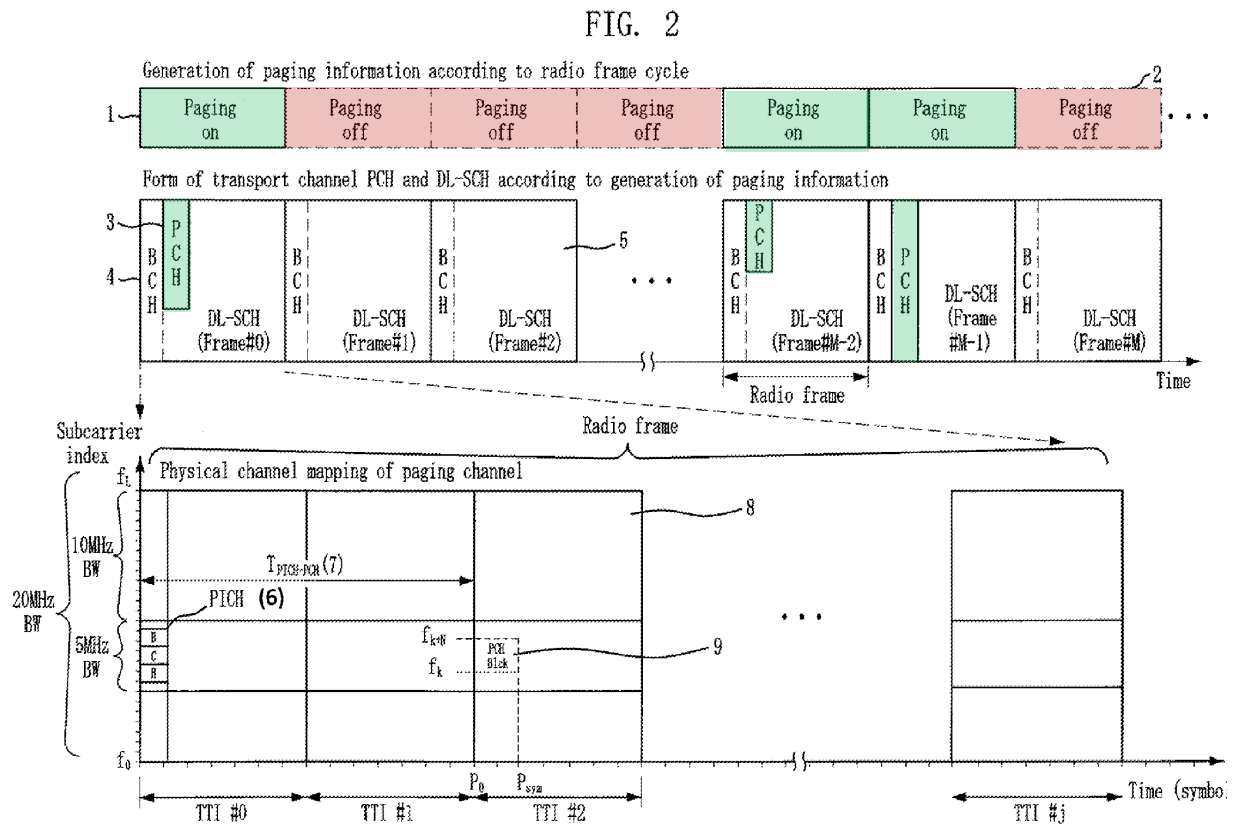


Ex.1005, Fig. 1 (partial, annotated); Ex.1003, ¶94.

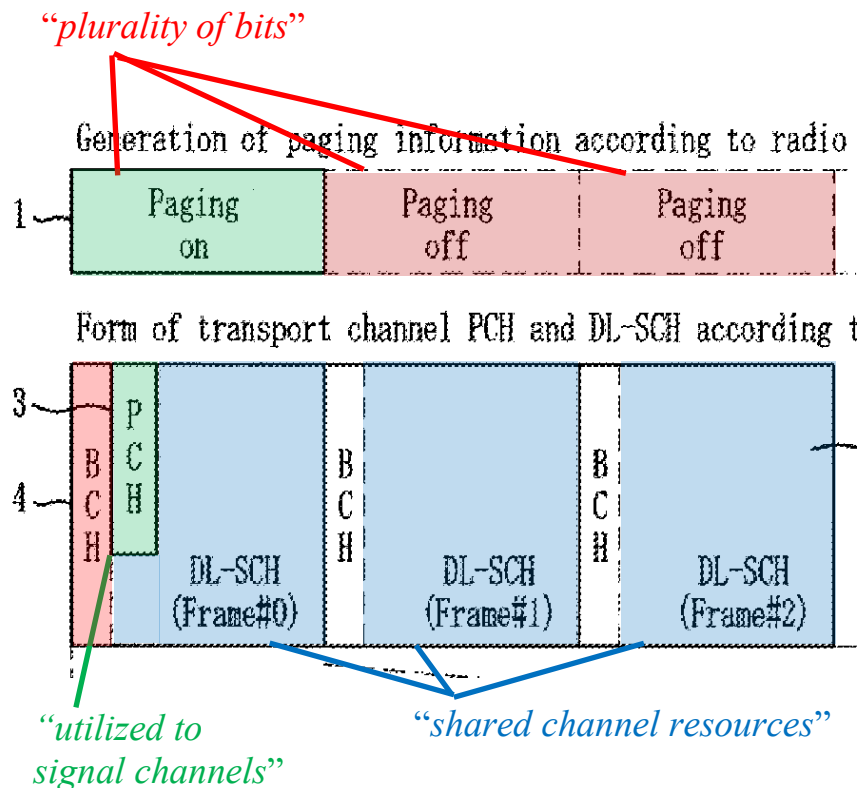
In other words, if the paging information (“*plurality of bits*”) for any terminal or group of terminals is ON, then a Paging Channel PCH will be included within the frame. Ex.1003, ¶95.

However, “[w]hen no paging information is generated (see 2 of FIG. 2), the paging channel does not exist in the transport channel of the radio frame (see 5 of FIG. 2). In this case, the paging indication channel is not also set up.” Ex.1005, 5:8-21. “Therefore, downlink shared channel (DL-SCH) information for user data

transmission and not paging information of the paging channel is transmitted to the radio resource block location of the physical layer fixed and allocated for the paging channel.” Ex.1005, 5:8-21; Ex.1003, ¶96. In other words, if no terminal within the cell is being paged and thus the paging information is OFF, then no PCH is placed within the frame. Ex.1003, ¶96. Instead, those resources are used as a downlink shared channel (DL-SCH). Ex.1005, 5:8-21.



Ex.1005, Fig. 2 (annotated); Ex.1003, ¶96.



Ex.1005, Fig. 2 (partial, annotated); Ex.1003, ¶96.

Kim illustrates this concept with respect to Fig. 2 shown above. When the paging information for any particular terminal is ON (in Frame#0), the PCH is included in the frame. On the other hand, when the paging information is OFF (in Frame#1 and Frame#2), the PCH is *not* included in the frame. Instead, those radio resources are used as part of the downlink shared channel DL-SCH ("*shared channel resources*"). See Ex.1005, 5:8-21. Accordingly, if any terminal is being paged, which may be indicated by any of the bits in the PICH ("*each of the plurality of bits*") for each respective frame, there will be a Paging Channel PCH within that respective frame. Otherwise, those radio resources are used for shared

channels. Ex.1005, 5:9-21; Ex.1003, ¶97.

The PCH is a “*signal channel*” because it is used for signaling control information. Ex.1005, 1:18-22. Kim explains that “a paging channel (PCH) is a transport channel and is transmitted through a secondary common **control** physical channel (S-CCPCH), which is a physical layer channel for transmitting **common control information**.” Ex.1005, 1:18-22; Ex.1003, ¶98.

The ’416 patent itself indicates that the Paging Channel PCH is a signaling channel. Ex.1001, 9:38-42. The ’416 patent explains that “it will be appreciated by a skilled artisan that the inventive concept described herein may be applied to **any direct signalling channel, such as a paging channel**, an allocation channel such as HS-SCCH or applied to alternative comparable services.” Ex.1001, 9:38-42; Ex.1003, ¶99.

Thus, because the indicator bits in the PICH indicate whether the PCH (a signaling channel) is to be used in place of the DL-SCH (a shared resource channel) for each respective frame, Kim discloses or at least renders obvious “*each of the plurality of bits indicates a respective time interval that physical shared channel resources are utilized to signal channels.*” Ex.1003, ¶¶89-100.

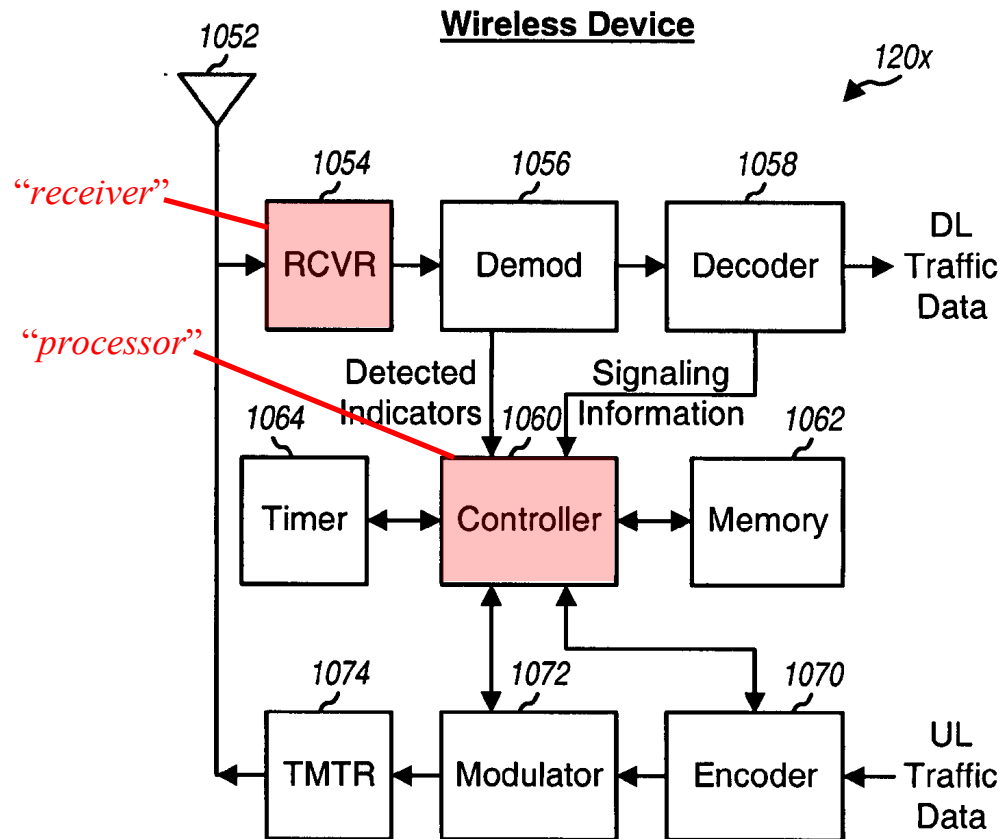
[1.3] a processor, the processor communicatively coupled to the receiver and

Kim in view of Vayanos render obvious limitation [1.3]. Ex.1003, ¶101-09.

First, as explained above at [1.1], Kim describes a terminal for receiving

information. Ex.1003, ¶101.

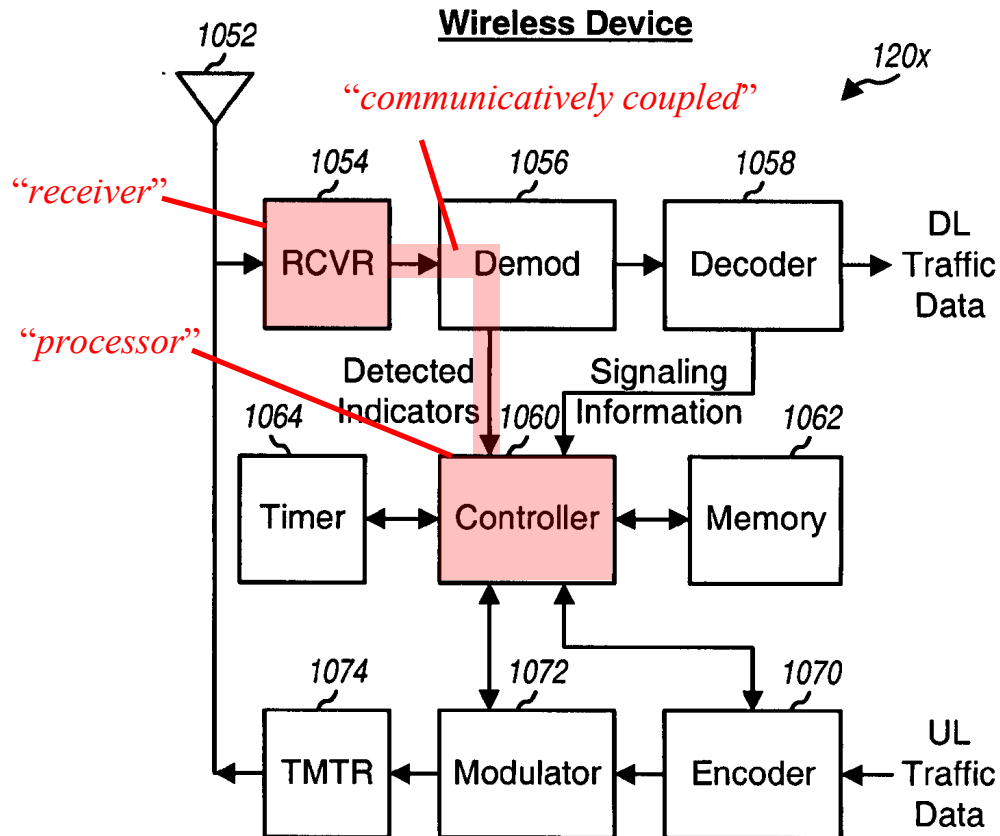
Second, a POSITA would have found it obvious for Kim’s terminal to include a *processor*. Ex.1003, ¶102. For example, Vayanos illustrates that standard 3GPP terminals, like Kim’s, include processors. Ex.1006, 12:12-64. Vayanos describes a controller 1060 as part of the wireless device, which may be, for example, “one or more...processors, controllers, micro-controllers, microprocessors.” Ex.1006, 12:33-64. “Controllers 1020 and 1060 may also perform various functions for transmission and reception, respectively, of notification indicators and signaling information for the services.” Ex.1006, 12:32-36; Ex.1003, ¶102.



Ex.1006, Fig. 10 (partial, annotated); Ex.1003, ¶102.

Third, Vayanos’s controller is “*communicatively coupled to*” the receiver because the controller processes data received through the receiver. Vayanos explains that the processor directs a demodulator to process data samples: “Receiver unit 1054 conditions (e.g., filters, amplifies, and frequency down converts) the received signal, digitizes the conditioned signal, and provides data samples. A demodulator (Demod) 1056 processes the data samples and provides symbol estimates. Demodulator 1056 further performs detection for notification indicators, paging indicators, and counting flags, **as directed by a controller**

1060.” Ex.1006, 12:12-24. Accordingly, it would have been obvious for Kim’s terminal to similarly include a processor that is communicatively coupled to the receiver as further illustrated in Fig. 10 below. Ex.1003, ¶¶103-04.



Ex.1006, Fig. 10 (partial, annotated); Ex.1003, ¶104.

While a POSITA would have recognized that Kim’s terminal would have inherently included a processor, a POSITA would have also found it obvious for Kim’s terminal to include a processor as taught by Vayanos. Ex.1003, ¶105.

Kim describes a mobile terminal that receives and decodes information. Vayanos’s terminal predictably performs these processing functions with a

processor, as explained above at Section XI.C.2. Vayanos describes a controller 1060 (processor) that “perform[s] various functions for transmission and reception, respectively, of notification indicators and signaling information for the services.” Ex.1006, 12:34-36; Ex.1003, ¶106.

A POSITA would have found it obvious for Kim’s terminal to similarly include a processor. Because Kim’s terminal decodes and processes the received radio transmissions, it would have been obvious—if not inherent—for Kim’s terminal to include a processor, as taught by Vayanos. Ex.1003, ¶107. Doing so would achieve the predictable result of Kim’s terminal receiving radio transmissions through a receiver and processing the received information with a processor. Ex.1003, ¶107.

Accordingly, the combination of Kim and Vayanos merely represents combining prior art elements (Kim’s terminal having a processor and terminal, as taught by Vayanos) according to known methods (configuring a terminal to have a receiver and processor) to yield predictable results (a terminal with a processor to process incoming data, as taught by Vayanos). The combination also represents applying a known technique (implementing a terminal with a receiver and processor as taught by Vayanos) to a known device (Kim’s terminal) ready for improvement to yield predictable results (processing received data with the processor). Ex.1003, ¶108.

Thus, because Kim describes a terminal that receives and processes information, it would have been obvious for Kim's terminal to include a receiver coupled to a processor as evidenced by Vayanos. Therefore, Kim and Vayanos render obvious "*a processor, the processor communicatively coupled to the receiver.*" Ex.1003, ¶¶101-109.

[1.4] *a processor ... configured to monitor the signaled channels in indicated time intervals, to determine whether signaling information for the UE is present based on an identification of the UE, and*

Kim in view of Vayanos render obvious limitation [1.4]. Ex.1003, ¶¶110-13.

Kim explains that the terminals search the PCH ("*signal channels*") at the designated time interval within each frame ("*in the indicated time intervals*"). Ex.1005, 1:38-55. According to known paging procedures, when the base station has a message for a terminal in the idle state, it will indicate as such through the bit or bits in the PICH that are assigned to that terminal (UE). *See* Ex.1005, 1:38-40. Each of the multiple terminals (UEs) assigned to that bit or bits will then check the paging information in the paging channel (PCH) to determine whether the paging message is for that specific terminal. *See* Ex.1005, 1:38-55; Ex.1003, ¶110.

Referring to a general paging procedure, Kim explains that the "terminals monitor the paging indication channel every monitoring cycle." Ex.1005, 1:38-45. Then, "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 paging information that an **identifier (ID)** ... exists.” Ex.1005, 1:45-50. The identifier may be, for example, “international mobile subscriber identity (IMSI), temporary mobile subscriber identity (TMSI), UMTS terrestrial radio access network-radio network temporary identifier (U-RNTI).” Ex.1005, 1:50-55. Accordingly, each terminal in the paging group checks the Paging Channel (PCH) and reads the identifier (e.g., IMSI, TMSI, or U-RNTI) to see if the paging message is for that particular terminal. *See* Ex.1005, 1:38-55; Ex.1003, ¶111.

Vayanos describes this process as well. “Each idle wireless device monitors the PICH for its paging indicators. If these paging indicators are set to ‘1’, then the wireless device processes the S-CCPCH to look for any messages sent for the wireless device.” Ex.1006, 2:56-3:2. As explained above at [1.3], the terminal is controlled by a processor. *See* Ex.1006, 12:33-64. Accordingly, in the known paging procedure described by Kim and Vayanos, if the PICH indicates the PCH time interval includes a message, the processor causes the terminal to check the PCH time interval for its identifier to determine whether there is a message for that terminal, which renders obvious “*a processor ... configured to monitor the signaled channels in indicated time intervals, to determine whether signaling information for the UE is present based on an identification of the UE.*” Ex.1003, ¶112.

Thus, because Kim and Vayanos describe the known paging procedure in

which a processor causes the terminal receiving a paging indicator through the PICH to search the Paging Channel (PCH) for any messages based on that terminal's identifier, Kim renders obvious "*configured to monitor the signaled channels in indicated time intervals, to determine whether signaling information for the UE is present based on an identification of the UE.*" Ex.1003, ¶113.

[1.5] a processor ... to process the signaling information in response to the determination that signaling information for the UE is present.

Kim in view of Vayanos render obvious limitation [1.5]. Ex.1003, ¶¶114-16.

Kim explains that the terminals decode the paging information ("*process the signaling information*"), which happens in response to determining that the PCH message is for that terminal ("*in response to the determination that signaling information for the UE is present.*"). See Ex.1005, 1:45-55. "As a result of monitoring, 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 paging information." Ex.1005, 1:45-50. The terminals then process the information in the PCH by "decoding the paging information." Ex.1005, 1:53-55; Ex.1003, ¶114.

Vayanos provides additional details as to this known paging procedure. For example, Vayanos explains that "[e]ach idle wireless device monitors the PICH for its paging indicators. If these paging indicators are set to '1', then the wireless

device processes the S-CCPCH to look for any messages sent for the wireless device.” Ex.1006, 2:65-3:2. “Whenever the notification indicator for any desired service is set to 1, the wireless device further processes the S-CCPCH to look for updated signaling information sent for that service.” Ex.1006, 4:14-18; Ex.1003, ¶115. As explained above at [1.3], the terminal is controlled by a processor. *See* Ex.1006, 12:33-64.

Thus, because Kim describes the known paging procedure in which a processor causes the terminal to process signaling information in the Paging Channel PCH if that signaling information is intended for that terminal, Kim renders obvious “*a processor ... to process the signaling information in response to the determination that signaling information for the UE is present.*” Ex.1003, ¶¶114-16.

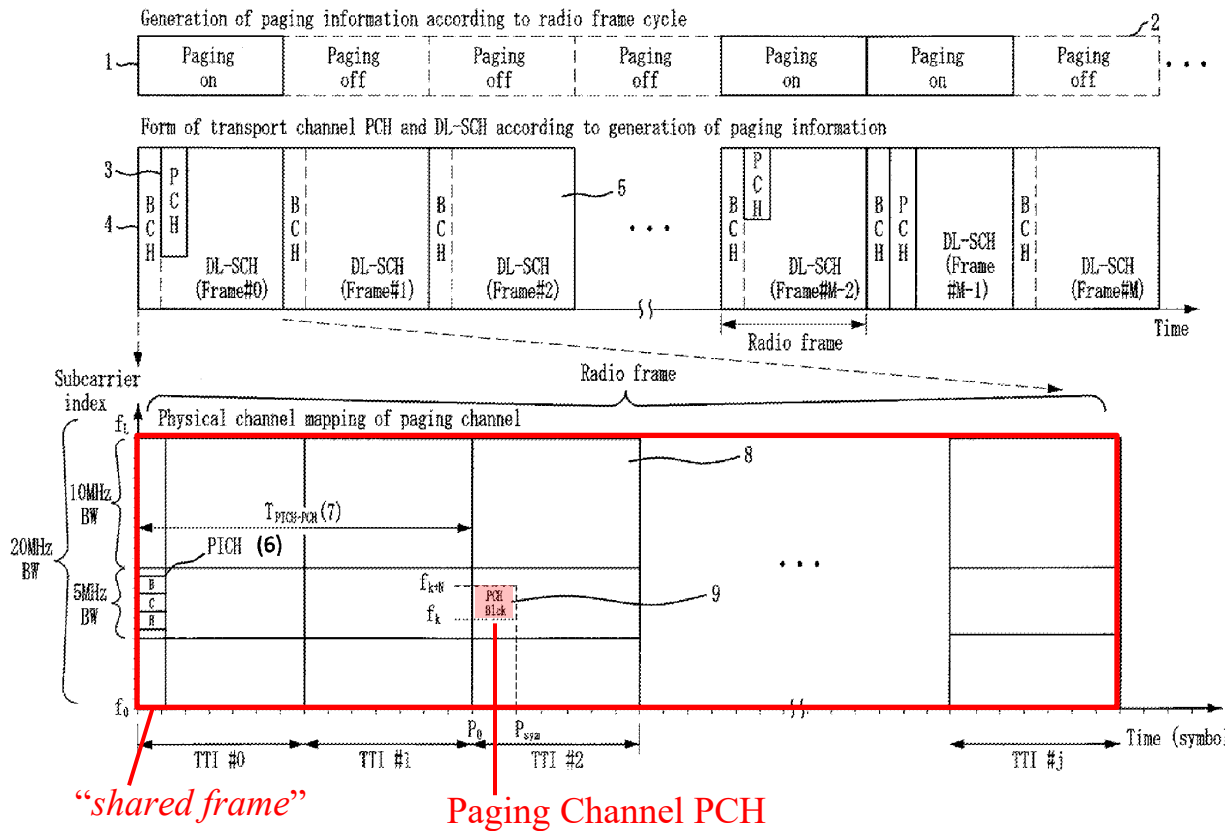
5. Claim 2

[2.0] *The UE of claim 1, wherein the respective time interval or each indicated time interval is part of a shared frame that is allocated by a network device.*

Kim renders obvious limitation [2.0]. Ex.1003, ¶117-20.

First, as explained above at [1.2], one example of a “*time interval*” is the Transmission Time Interval (TTI) in which the PCH is placed. As illustrated in Kim’s Fig. 2 below, the TTI for the PCH 9 is within a radio frame (“*shared frame*”). Ex.1003, ¶117.

FIG. 2



Ex.1005, Fig. 2 (annotated); Ex.1003, ¶117.

Kim's radio frame is a "shared" frame because it is shared by multiple terminals. Indeed, a portion of each frame is used as a "downlink shared channel DL-SCH." Ex.1005, 5:17-18. "The cellular system for the packet service may maximize applicability of a limited radio resource by sharing the radio resource between a base station and a terminal in consideration of a burst characteristic of packet service data differently from a circuit." Ex.1005, 3:38-40. "**In the packet transmission system**, since **the terminals in the base station share radio resources**, scheduling information for addressing the radio resource allocated to a

terminal or a terminal group should be transmitted such that the terminals in the base station can recognize the scheduling information.” Ex.1005, 4:29-36; Ex.1003, ¶118.

Second, the shared frames are allocated by a base station (“*network device*”). See Ex.1005, 4:64-67 (“The base station performs mapping on the paging channel with a radio resource block location 9 of a physical layer allocated at TTI 8 as a fixed size and location.”); Ex.1005, 4:57-61 (“the base station sets up a paging indication channel 6 corresponding to the terminal or the terminal group indicated by the paging information”). Accordingly, because the paging indication channel and Paging Channel PCH are established and scheduled by the base station, the frames to which they belong are allocated by the base station. Ex.1003, ¶119.

Thus, because Kim describes that the Paging Channel PCH is within a shared radio frame that is scheduled and transmitted by the base station, Kim renders this limitation obvious. Ex.1003, ¶120.

6. Claim 3

[3.0] *The UE of claim 1, wherein the broadcast information is received on a broadcast channel.*

Kim renders obvious limitation [3.0]. Ex.1003, ¶121.

As explained above at [1.1], the paging information (“*broadcast*

information”) is received on a Broadcast Channel BCH. Ex.1005, 4:42-57; Fig. 2.

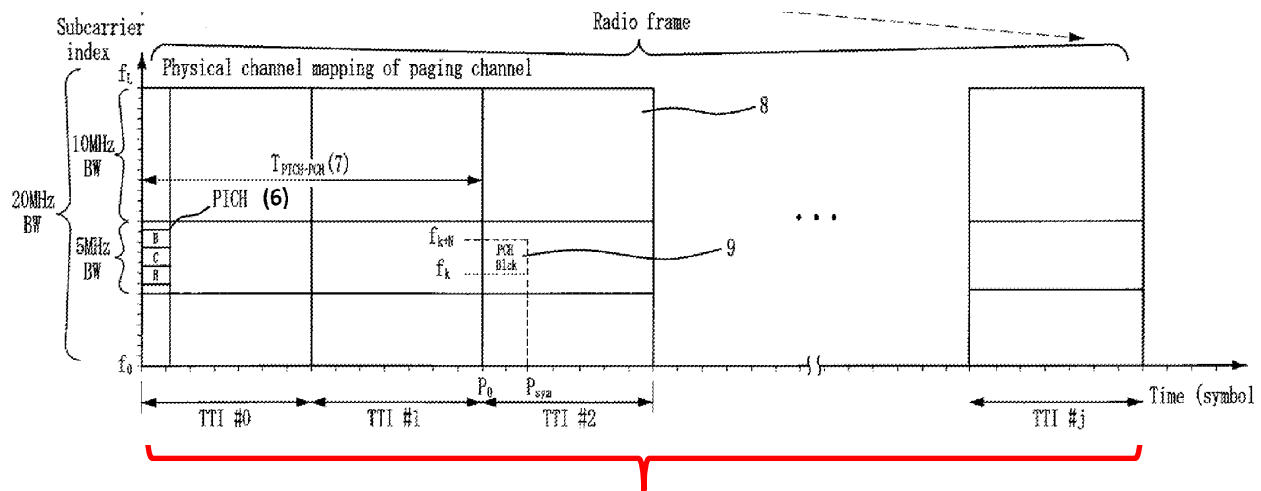
Accordingly, Kim renders this limitation obvious. Ex.1003, ¶121.

7. Claim 4

[4.0] *The UE of claim 1, wherein the respective time interval or each indicated time interval is two or more timeslots.*

Kim renders obvious limitation [4.0]. Ex.1003, ¶122-23.

As explained above at [1.2], one example of the claimed “*respective time interval*” is the respective frame in which the PCH is scheduled. As shown in Kim’s Fig. 2, each frame includes multiple transmission time intervals (TTIs) (“*two or more timeslots*”). Ex.1003, ¶122. “The scheduler performs scheduling on broadcasting channel (BCH) information, created paging channel information and, traffic information to be transmitted to the terminal **based on a transmission time interval (TTI) at step S130.**” Ex.1005, 4:53-56; *see also* Ex.1005, 4:64-5:8; Ex.1003, ¶122.



radio frame ("respective time interval") including
Multiple TTIs ("two or more timeslots")

Ex.1005, Fig. 2 (partial, annotated); Ex.1003, ¶122.

Thus, because Kim's radio frame includes multiple TTIs, Kim renders this limitation obvious. Ex.1003, ¶123.

8. Claim 5

[5.0] The UE [of] claim 1, wherein the UE powers down radio circuitry outside of the indicated time intervals.

Kim and Vayanos render obvious limitation [5.0]. Ex.1003, ¶124-28.

First, Kim explains that mobile terminals will enter an idle state when not engaged in active communication with the base station. *See* Ex.1005, 3:48-67. "Conventional paging information is transmitted to the terminals in an idle state, i.e., the terminals performing low power consumption, through a paging channel." Ex.1005, 3:48-67. "The RRC_Idle denotes a state that the RRC is not connected between the base station and the terminal. In the RRC_Idle state, access GateWay

(aGW) manages mobility of the terminal. The terminal in the RRC_Idle state performs a low power consumption, i.e., power saving operation.” Ex.1005, 3:48-67; Ex.1003, ¶124.

Vayanos similarly describes terminals entering the low power state. “In UMTS, a Page Indicator Channel (PICH) is used to send paging indicators to idle wireless devices.” Ex.1006, 2:56-3:2. An idle wireless device may be a wireless device operating in an idle mode.” Ex.1006, 2:56-3:2. “Each idle wireless device monitors the PICH for its paging indicators. If these paging indicators are set to ‘1’, then the wireless device processes the S-CCPCH to look for any messages sent for the wireless device.” Ex.1006, 2:56-3:2; Ex.1003, ¶125.

By entering the idle state, the terminal “*powers down radio circuitry.*” Ex.1003, ¶126. Kim explains that a “terminal in the RRC_Idle state performs a low power consumption, i.e., power saving operation, according to a discontinuous reception (DRX) cycle based on RRC configuration.” Ex.1005, 3:64-67.

“Conventional paging information is transmitted to the terminals in an idle state, i.e., the terminals performing low power consumption.” Ex.1005, 3:49-51.

“Conventional paging information is transmitted to the terminals in an idle state, i.e., the terminals performing low power consumption.” Ex.1005, 4:57-59. Kim further explains that the power is used for radio resources: “another radio resource, i.e., power,” Accordingly, by entering into an idle state (low power state), a

terminal provides less power to the radio circuitry of that terminal. Ex.1003, ¶126.

Second, the terminal remains in the idle state in frames where there is no paging information for that terminal (“*outside of the indicated time intervals*”). As explained above at [1.2], the claimed time interval is a specific frame in which the PICH indicates there is paging information for a terminal. Ex.1003, ¶127.

Thus, because Kim’s terminal—following known paging procedures—goes into an idle state to power down its radio circuitry outside of frames with a PCH placed within, Kim and Vayanos renders this limitation obvious. Ex.1003, ¶124-28.

9. Claim 6

[6.0] *The UE of claim 1, wherein the identification of the UE is assigned by a network device to decode the signaling information.*

Kim and Vayanos renders obvious limitation [6.0]. Ex.1003, ¶¶129-34.

First, as mentioned above at [1.4], Kim uses an identifier “such as international mobile subscriber identity (IMSI), temporary mobile subscriber identity (TMSI), UMTS terrestrial radio access network-radio network temporary identifier (U-RNTI)” to identify a particular terminal. Ex.1005, 1:49-51; Ex.1003, ¶129.

Second, a POSITA would have understood that the U-RNTI is assigned by a Radio Network Controller (RNC (“*a network device*”) within the UTRAN

network. *See generally* Ex.1015. A U-RNTI is a UTRAN Radio Network Temporary Identifier that is assigned by the RNC during a connection set-up request. As explained in Holma, a 3GPP textbook:

In the RRC connection establishment procedure this initial UE identifier is used only for the purpose of uniqueness and can be discarded by UTRAN after the procedure ends. Thus, when these UE identities are later needed for the higher layer (non-access stratum) signalling, they must be resent (in the higher layer messages). **The RRC Connection set-up message may include a dedicated physical channel assignment for the UE (move to Cell_DCH state), or it can command the UE to use common channels** (move to Cell_FACH state). In the latter case, **a radio network temporary identity (U-RNTI and possibly C-RNTI) to be used as UE identity on common transport channels is allocated to the UE.**

Ex.1015, 171.

As shown in Fig. 7.17 below, the RRC Connection set-up message, which allocates the U-RNTI, is sent by the RNC (“*a network device*”). Ex.1003, ¶131.

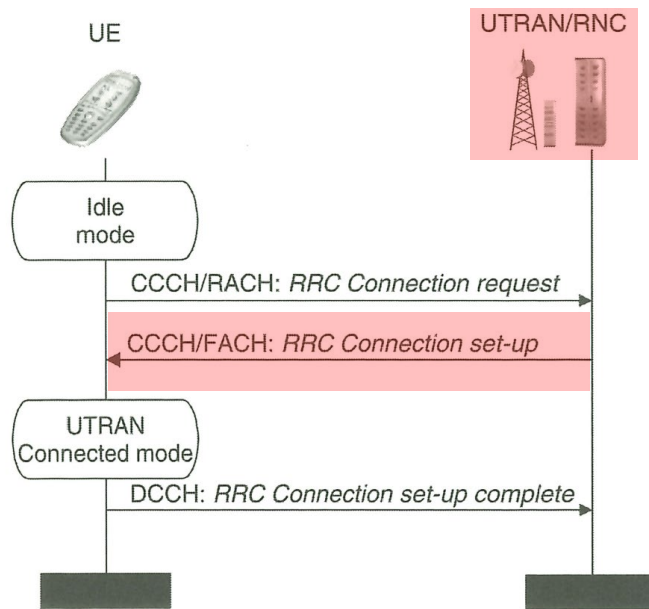


Figure 7.17. RRC connection establishment procedure

Ex.1015, Fig. 7.17 (annotated); Ex.1003, ¶131.

Accordingly, a POSITA would have understood—based on background knowledge evidenced by the Holma textbook (Ex.1015)—that Kim’s U-RNTI is assigned by a radio network controller (RNC). *See also.*, Ex.1007, 3:65-66 (“**U-RNTI** (UTRAN RNTI) consists of an SRNC identity and an S-RNTI”); Ex.1007, 3:54-55 (“S-RNTI (Serving RNC RNTI) is **assigned by an SRNC (Serving RNC)**”). Ex.1003, ¶131. Kim’s system is managed by a Radio Network Controller (RNC) because Kim applies to a UMTS system. Ex.1005, 1:51. UMTS systems include RNCs as evidenced by Vayanos. *See* Ex.1006, Fig. 1, 2:16-34.

Accordingly, the U-RNTI is not something that is assigned by the UE’s manufacturer, but is a temporary identifier used for RRC connection sessions. *See* Ex.1015, 171-72; Ex.1003, ¶132.

Third, as also explained above at [1.4], the identifier such as the U-RNTI is used to decode the information within the PCH. Ex.1005, 1:38-55; Ex.1003, ¶133.

Thus, because Kim’s terminal uses a U-RNTI assigned by the base station to decode paging information, and a POSITA would have understood that the U-RNTI is assigned by the RNC, Kim renders this limitation obvious. Ex.1003, ¶134.

10. Claims 7-12

Claims 7-15 recite a “method” that performs the functions of the user equipment (UE) recited in claims 1-6, respectively. *See* Claim Appendix.

Accordingly, in the analysis of claims 7-12 below, Petitioner refers back to the corresponding limitation of claims 1-6, respectively, where appropriate. Ex.1003, ¶135.

11. Claim 7

[7.0] *A method performed by a user equipment (UE), the method comprising:*

See [1.0]. As explained above at [1.0], Kim explains that a terminal (“UE”) receives transmissions from a base station. Kim discloses methods performed by both the base station and the UE. Specifically, Kim describes “a **method** for transmitting paging information ... from a base station **to a terminal**” (“*user equipment (UE)*”) in a cellular system. Ex.1005, 1:5-10; *see also* Ex.1005, claim 1 (“A **method** for decoding paging information **at a terminal** in a wireless communication system.”); Ex.1003, ¶136. For the reasons that Kim’s UE performs

the functionality recited in claim 1, Kim teaches the method steps performed by the UE as recited in the claim. Ex.1003, ¶136.

[7.1] *receiving, by the UE, broadcast information including a plurality of bits,*

See [1.1]. Ex.1003, ¶137.

[7.2] *wherein each of the plurality of bits indicates a respective time interval that physical shared channel resources are utilized to signal channels;*

See [1.2]. Ex.1003, ¶138.

[7.3] *monitoring, by the UE, the signaled channels in indicated time intervals;*

See [1.4]. Ex.1003, ¶139.

[7.4] *determining, by the UE, whether signaling information for the UE is present based on an identification of the UE; and*

See [1.4]. Ex.1003, ¶140.

[7.5] *processing, by the UE, the signaling information in response to the determination that signaling information for the UE is present.*

See [1.5]. Ex.1003, ¶141.

12. Claim 8

[8.1] *The method of claim 7, wherein the respective time interval or each indicated time interval is part of a shared frame that is allocated by a network device.*

See [2.1]. Ex.1003, ¶142.

13. Claim 9

[9.1] *The method of claim 7, wherein the broadcast information is received on a broadcast channel.*

See [3.1]. Ex.1003, ¶143.

14. Claim 10

[10.1] *The method of claim 7, wherein the respective time interval or each indicated time interval is two or more timeslots.*

See [4.1]. Ex.1003, ¶144.

15. Claim 11

[11.1] *The method [of] claim 7, wherein the UE powers down radio circuitry outside of the indicated time intervals.*

See [5.1]. Ex.1003, ¶145.

16. Claim 12

[12.1] *The method of claim 7, wherein the identification of the UE is assigned by a network device to decode the signaling information.*

See [6.1]. Ex.1003, ¶146.

D. Ground 2: Claims 1-12 are obvious over Kim, Vayanos, and AAPA.

To the extent Patent Owner argues that Kim or Vayanos do not expressly teach any of the limitations of the Challenged Claims, Petitioner cites the applicant admitted prior art (AAPA) in the background section of the '416 patent below to show that it would have been obvious for Kim and Vayanos to be implemented according to known prior art techniques as evidenced by the AAPA. Ex.1003, ¶147.

Ground 2 relies on AAPA to confirm the teachings of Kim and Vayanos

(which are patents) and is thus consistent with the Federal Circuit case law and USPTO guidance on AAPA. *See Qualcomm Inc. v. Apple Inc.*, 24 F.4th 1367 (Fed. Cir. 2022) (holding that “‘patents or printed publications’ that form the ‘basis’ of a ground for *inter partes* review must themselves be prior art to the challenged patent.”).

As the Director has explained, “evidence of the skilled artisan’s knowledge, however, remains fundamental to a proper obviousness analysis.” Ex.1016, 3 (citing *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 401 (2007)). “The Federal Circuit has explained that because a properly conducted § 103 inquiry ‘necessarily depends’ on the knowledge possessed by the ordinarily-skilled artisan, such knowledge must be considered in an IPR, notwithstanding the provisions of §311 (b).” Ex.1016, 3. Accordingly, AAPA is “permissible evidence in an *inter partes* review for establishing the background knowledge possessed by a person of ordinary skill in the art” and “provide[s] a factual foundation as to what a skilled artisan would have known at the time of invention.” *Qualcomm*, 24 F.4th at 1376.

The Director has provided the following guidance:

A patentee’s admissions regarding the scope and content of the prior art under § 103 can be used, for example, to:

- (1) supply missing claim limitations that were generally known in the art prior to the invention (for pre-America Invents Act (AIA) patents) or the effective filing date of

the claimed invention (for post-AIA patents); (2) support a motivation to combine particular disclosures; or (3) demonstrate the knowledge of the ordinarily-skilled artisan at the time of the invention (for pre-AIA patents) or the effective filing date of the claimed invention (for post-AIA patents) for any other purpose related to patentability. *See Qualcomm*, 24 F.4th at 1376; *see also Koninklijke Philips*, 948 F.3d at 1337-1338.

Ex.1016, 4.

The Director’s guidance further explains that AIPA “may include statements in the specification of the challenged patent such as ‘It is well known that ... ,’ ‘It is well understood that ... ,’ or ‘One of skill in the art would readily understand that ...,’ or may describe technology as ‘prior art,’ ‘conventional,’ or ‘well-known.’” Ex.1016, 4 (citing *McCoy v. Heal Sys., LLC*, 850 F. App’x 785, 789 (Fed. Cir. 2021) (non-precedential) (finding it was not an error for the Board in an IPR proceeding to accept the specification’s own assertions of what was ‘conventional’ and therefore well known in the art). Further, because “the Federal Circuit has made clear that it is appropriate in an IPR to rely on admissions in an obviousness analysis ... Board panels should review whether the asserted ground as a whole as applied to each challenged claim as a whole relies on admissions in the specification in combination with reliance on at least one prior art patent or printed publication.” Ex.1016, 6.

Here, the analysis of Ground 2 relies on statements made by the Applicant to confirm that the teachings of Kim and Vayanos were known in the art. Thus, the AAPA is not the “basis” of Ground 2. Rather, the AAPA shows that certain claim limitations were known in the art, consistent with the teachings of Kim and Vayanos. *See* Ex.1016, 3-5.

1. Applicant Admitted Prior Art (AAPA)

The background section of the ’416 patent includes several columns of text that describe what was known in the art as of the earliest claimed priority date of the ’416 patent, particularly, the known paging procedures. *See* Ex.1001, 1:25-5:50. The background section refers to three separate figures, each of which is labeled as prior art. *See* Ex.1001, Figs. 1-3 (all labeled as “Prior Art”). The background section repeatedly uses phrases such as “in the known art” and “it is known.” *See* Ex.1001, 1:25-5:50. Accordingly, the background section of the ’416 patent represents Applicant Admitted Prior Art (AAPA) that is representative of the background knowledge of a POSITA. *See* Ex.1016, 4; Ex.1003, ¶148.

The analysis in Ground 1 shows how each claim limitation is taught by Kim and Vayanos. Ground 2 additionally cites to the AAPA of the ’416 patent background (hereinafter “AAPA”) to show that the teachings of Kim and Vayanos are consistent with what the applicant of the ’416 patent understood to be prior art. Ex.1003, ¶149. For example, the AAPA also shows that (i) a PICH includes a

plurality of bits (relevant to [1.1]), (ii) the terminal monitors the PCH at the designated time interval (relevant to [1.4]), and (iii) the terminal processes the signaling information (relevant to [1.5]). *See* Ex.1001, 1:25-5:50; Ex.1003, ¶149.

2. Reasons to Combine the AAPA with Kim and Vayanos

A POSITA would have found it obvious for Kim's terminal to operate according to known paging procedures consistent with the 3GPP standards, which are described in the AAPA. Ex.1003, ¶150.

Kim describes a known method for paging, which includes using the Paging Indication Channel PICH and the Paging Channel PCH. In particular, Kim describes "setting a **paging indication channel (PICH)** based on the paging information and forming the paging indication channel in a radio resource of a physical layer." Ex.1005, 2:34-37. "[P]aging information is transmitted to the terminals in the RRC Idle state through the paging indication channel." Ex.1005, 4:42-45. "The terminals monitor the paging indication channel every monitoring cycle." Ex.1005, 1:43-44. "As a result of monitoring, 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 paging information." Ex.1005, 1:44-49; Ex.1003, ¶151.

Kim further describes how an identifier is used for decoding the information

in the paging channel. “[T]he terminals search PCH information transmitted to the S-CCPCH channel and decode paging information that an identifier (ID) such as international mobile subscriber identity (IMSI), temporary mobile subscriber identity (TMSI), UMTS terrestrial radio access network-radio network temporary identifier (U-RNTI).” Ex.1005, 1:47-52; Ex.1003, ¶152.

The AAPA describes a similar paging process. Like the RRC idle state described in Kim (Ex.1005, 4:42-45), the AAPA explains that to conserve battery power, “it is known for the UE 120 to go into an idle state, whereby the UE powers down its radio frequency circuitry (RF).” Ex.1001, 1:54-57. When the idle UE powers on its radio circuitry, it will check what is called the Paging Indication Channel PICH. Ex.1001, 2:11-20. “The PICH comprises multiple indicator bits. Each UE is associated with one of the indicator bits within the PICH.” Ex.1001, 2:12-14. “When in the idle state, the UE periodically decodes the PICH to see if the indicator bit with which it is associated has been set.” Ex.1001, 2:16-18; Ex.1003, ¶153.

According to the AAPA, and like what is described in Kim, the Paging Indication Channel PICH is associated with a Paging Channel PCH. “If the relevant indicator has been set, the UE then reads the [Paging Channel] PCH.” Ex.1001, 2:19-20. “The PCH is a downlink transport channel that is used to carry control information to a UE.” Ex.1001, 2:7-8; Ex.1003, ¶154.

To decode the information in the Paging Channel PCH, the AAPA describes that the UE uses an identifier. Ex.1001, 2:21-34. As explained in the AAPA, “[e]ach UE has a unique identifier (UE-ID).” Ex.1001, 2:21-25. When the network pages a UE, as previously mentioned, the network ... transmits the UE-ID for the UE being paged, and the relevant message within the PCH.” Ex.1001, 2:21-25. Accordingly, “in the known art, the indicator bits are used in a paging channel to inform the UE whether it needs to turn its radio on for reading the PCH (i.e. as a battery saving mode).” Ex.1001, 2:30-31; Ex.1003, ¶155.

A POSITA would have found it obvious for Kim’s terminals to operate in the known manner of performing paging operations as described in the AAPA. Both Kim and the AAPA describe similar paging procedures. Indeed, both Kim and the AAPA refer to industry standards for UMTS systems as provided by 3GPP. The AAPA refers to “[k]nown cellular communication systems, such as a **Universal Mobile Telecommunications System (UMTS)** Radio Access Network (UTRAN), standardised by the 3rd Generation Partnership Project (**3GPP**).” Ex.1001, 1:25-28. Kim similarly describes a “conventional cellular system” such as a “3rd Generation Partnership Project (**3GPP**) system of a Wideband Code Division Multiple Access (WCDMA) method,” which may use a “**UMTS** terrestrial radio access network-radio network temporary identifier (U-RNTI).” Ex.1005, 1:14-17, 1:51-52. Because both Kim and the AAPA describe various

aspects of the known paging procedure, a POSITA would have reasonably expected success in implementing Kim's terminal with any of the known paging procedures as described by the AAPA. Ex.1003, ¶156.

A POSITA would have found it beneficial to implement known and standardized paging procedures (such as those described in the AAPA) to ensure compatibility and marketability of the product. Ex.1003, ¶157. Moreover, a POSITA would have found it beneficial and advantageous to implement Kim's devices with standardized paging techniques (e.g., bits in the PICH, monitoring the PCH, decoding the PCH using an identifier) because such standardized techniques have already been well vetted and tested for workability. Ex.1003, ¶157. Indeed, the combination is nothing more than "the predictable use of prior art elements according to their established functions." *See KSR Int'l v. Teleflex Inc.*, 550 U.S. 398, 417 (2007).

Thus, the combination of Kim with the AAPA is merely combining prior art elements (Kim's devices and AAPA paging procedures) according to known methods (e.g., bits in the PICH, monitoring the PCH, decoding the PCH using an identifier) to yield predictable results (using the PICH to instruct specific terminals to check and decode information in the PCH). The combination is also a known technique (AAPA paging procedures that were known in the art) to a known method (Kim's paging procedure) to yield predictable results (using the PICH to

instruct specific terminals to check and decode information in the PCH). Ex.1003, ¶158.

3. Claim Analysis

The claim analysis for this ground is substantially the same as that of Ground 1. To the extent Patent Owner argues that the teachings of Kim or Vayanos are lacking for any limitation in Ground 1 that additionally cites to AAPA, it would have been obvious to modify Kim in view of Vayanos for the reasons explained at XI.D.2. Ex.1003, ¶159.

4. Claim 1

[1.0] *A user equipment (UE) comprising:*

See [1.0], Ground 1. Ex.1003, ¶160.

[1.1] *a receiver, the receiver configured to receive broadcast information including a plurality of bits,*

See [1.1], Ground 1. Ex.1003, ¶161.

Additionally, the AAPA confirms that a PICH includes a plurality of bits. “**In the known art**, the PCH comprises two blocks: the Paging Indicator CHannel (PICH) and the PCH itself. **The PICH comprises multiple indicator bits**. Each UE is associated with one of the indicator bits within the PICH.” Ex.1001, 2:11-14. Accordingly, it would have been obvious for Kim’s PICH to similarly include a plurality of bits. Ex.1003, ¶162.

Thus, because Kim’s disclosure of a terminal receiving paging information within a Paging Indicator Channel (PICH) in the Broadcast Channel, in view of Vayanos’s disclosure of a receiver in a terminal receiving the standard PICH with a plurality of indicator bits and confirmed by AAPA, Kim, Vayanos, and the AAPA render this limitation obvious Ex.1003, ¶163.

[1.2] wherein each of the plurality of bits indicates a respective time interval that physical shared channel resources are utilized to signal channels; and

See [1.2], Ground 1. Ex.1003, ¶164.

[1.3] a processor, the processor communicatively coupled to the receiver and

See [1.3], Ground 1. Ex.1003, ¶165.

[1.4] configured to monitor the signaled channels in indicated time intervals, to determine whether signaling information for the UE is present based on an identification of the UE, and

See [1.4], Ground 1. Ex.1003, ¶166.

Additionally, the AAPA confirms that this paging procedure is known. The ’416 patent explains that “[e]ach UE has a unique identifier (UE-ID). When the network pages a UE, as previously mentioned, the network sets the relevant indicator within the PICH for that UE, and transmits the UE-ID for the UE being paged, and the relevant message within the PCH.” Ex.1001, 2:21-25. “In this manner, since more than one UE may be associated with an indicator bit in the PICH, the UE-ID enables a UE to determine whether the message is intended for

that UE or not.” Ex.1001, 2:26-28. “If the PCH contains the UE-ID for the UE, the UE then reads the message, and performs the required actions. **Thus, in the known art**, the indicator bits are used in a paging channel to inform the UE whether it needs to turn its radio on for reading the PCH (i.e. as a battery saving mode).” Ex.1001, 2:28-34; Ex.1003, ¶167.

Thus, because Kim describes the known paging procedure (confirmed by AAPA) in which a terminal receiving a paging indicator through the PICH will search the Paging Channel PCH for any messages based on that terminal’s identifier, Kim in view of the AAPA renders this limitation obvious. Ex.1003, ¶168.

[1.5] to process the signaling information in response to the determination that signaling information for the UE is present.

See [1.5], Ground 1. Ex.1003, ¶169.

Additionally, the AAPA also shows that this was part of the known paging procedure. “In this manner, since more than one UE may be associated with an indicator bit in the PICH, the UE-ID enables a UE to determine whether the message is intended for that UE or not. If the PCH contains the UE-ID for the UE, the UE then reads the message, and performs the required actions.” Ex.1001, 2:25-30; Ex.1003, ¶170.

Thus, because Kim describes the known paging procedure (confirmed by

AAPA) in which a terminal processes signaling information in the Paging Channel PCH if that signaling information is intended for that terminal, Kim in view of the AAPA renders this limitation obvious. Ex.1003, ¶171.

5. Claims 2-4

See claims 2-4, Ground 1. Ex.1003, ¶172.

6. Claim 5

[5.0] *The UE [of] claim 1, wherein the UE powers down radio circuitry outside of the indicated time intervals.*

See [5.0], Ground 1. Ex.1003, ¶173.

Additionally, the idle state described by Kim is consistent with the idle state described in the '416 patent, in which radio circuitry is powered down. The AAPA states: “[i]n order to conserve battery life, when a UE 120 is not involved in active connections, it is known for the UE 120 to go into an idle state, whereby the UE powers down its radio frequency circuitry (RF).” Ex.1001, 1:54-67. Further, “it is known for a UE 120 to periodically power up its radio circuitry in order to monitor specific channels in order to determine whether it is required to establish a connection with the network.” Ex.1001, 1:54-67; Ex.1003, ¶174.

Thus, because Kim’s terminal—following known paging procedures (confirmed by AAPA)—goes into an idle state to power down its radio circuitry outside of frames with a PCH placed within, Kim in view of the AAPA renders

this limitation obvious. Ex.1003, ¶175.

7. Claim 6

[6.0] *The UE of claim 1, wherein the identification of the UE is assigned by a network device to decode the signaling information.*

See [6.0], Ground 1. Ex.1003, ¶176.

8. Claim 7

[7.0] *A method performed by a user equipment (UE), the method comprising:*

See [7.0], Ground 1. As explained above at [1.0], Kim explains that a terminal (“UE”) receives transmissions from a base station. For the reasons that Kim’s UE performs the functionality recited in claim 1, Kim teaches the method steps performed by the UE as recited in the claim. Ex.1003, ¶177.

[7.1] *receiving, by the UE, broadcast information including a plurality of bits,*

See [7.1], Ground 1. Additionally, for the reasons explained above at [1.1], Ground 2, the AAPA confirms the prior art teachings and thus further renders obvious the claim limitations. Ex.1003, ¶178.

[7.2] *wherein each of the plurality of bits indicates a respective time interval that physical shared channel resources are utilized to signal channels;*

See [7.2], Ground 1. Ex.1003, ¶179.

[7.3] *monitoring, by the UE, the signaled channels in indicated time intervals;*

See [7.3], Ground 1. Additionally, for the reasons explained above at [1.4], Ground 2, the AAPA confirms the prior art teachings and thus further renders

obvious the claim limitations. Ex.1003, ¶180.

[7.4] determining, by the UE, whether signaling information for the UE is present based on an identification of the UE; and

See [7.4], Ground 1. Additionally, for the reasons explained above at [1.4], Ground 2, the AAPA confirms the prior art teachings and thus further renders obvious the claim limitations. Ex.1003, ¶181.

[7.5] processing, by the UE, the signaling information in response to the determination that signaling information for the UE is present.

See [7.5], Ground 1. Additionally, for the reasons explained above at [1.5], Ground 2, the AAPA confirms the prior art teachings and thus further renders obvious the claim limitations. Ex.1003, ¶182.

9. Claims 8-10

See claims 8-10, Ground 1. Ex.1003, ¶183.

10. Claim 11

[11.1] The method [of] claim 7, wherein the UE powers down radio circuitry outside of the indicated time intervals.

See [11.1], Ground 1. Additionally, for the reasons explained above at [5.1], Ground 2, the AAPA confirms the prior art teachings and thus further renders obvious the claim limitations. Ex.1003, ¶184.

11. Claim 12

[12.1] The method of claim 7, wherein the identification of the UE is assigned by a network device to decode the signaling information.

See [12.1], Ground 1. Ex.1003, ¶185.

XII. DISCRETIONARY DENIAL IS INAPPROPRIATE

A. No basis for § 325(d) denial

Denial under § 325(d) is not warranted because the challenges presented in this petition are neither cumulative nor redundant to the prosecution of the '416 patent. The Examiner did not consider Kim or Vayanos, or the combination of Kim and Vayanos as presented in this Petition. Accordingly, the Board should not exercise its discretion to deny this petition under § 325(d).

B. No basis for *Fintiv* denial

The Board balances six factors in considering denial under § 314. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (Mar. 20, 2020) (precedential). These factors strongly favor institution. The district court case is in its very early stages. Patent Owner filed its complaint on April 12, 2024 (Ex.1010) and trial is currently scheduled for May 14, 2026. Ex.1011 (proposed Scheduling Order). Petitioner has worked diligently to prepare this Petition, which is being filed well within the one-year timeframe allowed by Congress.

1. No evidence regarding a stay

No motion to stay has been filed, so the Board should not infer the outcome of such a motion. *Sand Revolution II, LLC v. Continental Intermodal Group* –

Trucking LLC, IPR2019-01393, Paper 24 at 7 (June 16, 2020) (informative). Thus, this factor is neutral on discretionary denial.

2. Parallel proceeding trial date

This factor weighs against discretionary denial because the projected trial date—based on median time-to-trial statistics—is in January of 2027¹, which is after the projected date for the Board to issue a Final Written Decision in May or June of 2026. While trial is currently proposed² for May 14, 2026 (Ex.1011, 4), the Board recognizes “that scheduled trial dates are unreliable and often change.” *See* Director’s Memorandum on Discretionary Denials (Ex.1013), 8. Moreover, Petitioner notes that “a court’s general ability to set a fast-paced schedule is not particularly relevant... where, like here, the forum itself has not historically resolved cases so quickly.” *In re Apple Inc.*, 979 F.3d 1332, 1344 (Fed. Cir. 2020). Accordingly, the Board uses median time-to-trial statistics in the relevant venue to determine a projected trial date for *Fintiv* purposes. Ex.1013, 9. Because the projected trial date is approximately six or seven months *after* the Board’s

¹ The current average time-to-trial for the district court hearing the co-pending litigation is 32.7 months. *See* Ex.1012.

² The district court has not entered an order scheduling a trial date.

expected date for issuing a Final Written Decision, this factor weighs against discretionary denial.

3. Investment in the parallel proceeding

The investment in the co-pending litigation has been minimal. As mentioned above, a claim construction hearing has not yet occurred, fact discovery is not scheduled until April 11, 2025, and expert discovery is not scheduled until November 20, 2025. Ex.1018, 3-6; *see PEAG LLC v. Varta Microbattery GmbH*, IPR2020-01214, Paper 8 at 17 (Jan. 6, 2021). This lack of investment favors institution.

Moreover, Petitioner only learned which claims were being asserted in August 2024. *See* Ex.1014 (infringement contentions cover pleading). Since then, Petitioner has worked expeditiously to file this petition within four months. And, as of this filing, Patent Owner has not yet served its final infringement contentions. Under *Fintiv*, Petitioner’s prompt filing “weigh[s] against exercising the authority to deny institution.” *Fintiv*, Paper 11 at 11.

4. Overlapping issues with the parallel proceeding

The co-pending litigation is in its early stages. Petitioner served its preliminary invalidity contentions on October 24, 2024. However, Petitioner will not serve its final invalidity contentions until May 22, 2025, well after the Board

would issue an institution decision in this case. Ex.1011, 3. The extent of overlap is thus speculative at this point in time.

5. Petitioner is a defendant

Petitioner is a defendant in the co-pending litigation. That is true of most Petitioners in IPR proceedings, making this factor neutral. *See HP Inc. v. Slingshot Printing LLC*, IPR2020-01084, Paper 13 at 9 (Jan. 14, 2021).

6. Other circumstances

“[T]he PTAB will not deny institution of an IPR or PGR under *Fintiv* (i) when a petition presents compelling evidence of unpatentability.” Ex.1013, 9. Here, the petition—along with Dr. Ding’s expert testimony—plainly shows that the ’416 patent claims no more than well-known subject matter.

Because the *Fintiv* factors are either neutral or weigh against discretionary denial, institution should not be denied on discretionary factors.

C. No basis for *General Plastic* denial

The ’416 patent has not been challenged in any prior IPR petition, so *General Plastic* discretionary institution does not apply to this Petition. *See General Plastic Indus. Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 at 16 (Sept. 6, 2016) (Section II.B.4.i. precedential).

XIII. CONCLUSION

Petitioner has established a reasonable likelihood that the Challenged Claims are unpatentable.

Respectfully submitted,

Dated: November 21, 2024
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XIV. MANDATORY NOTICES

A. Real party-in-interest

Pursuant to 37 C.F.R. § 42.8(b)(1), Petitioner certifies that the real party-in-interest is Tesla, Inc.

B. Related matters

Pursuant to 37 C.F.R. § 42.8(b)(2), to the best knowledge of the Petitioner, the '416 patent is or was involved in the following cases:

Case Heading	Number	Court	Filed
<i>Intellectual Ventures II LLC v. Tesla, Inc</i>	<i>WDTX-1-24-cv-00390</i> (terminated)	WDTX	Apr. 11, 2024
<i>Intellectual Ventures II LLC v. Tesla, Inc.</i>	<i>WDTX-6-24-cv-00188</i> (transferred)	WDTX	Apr. 12, 2024
<i>Intellectual Ventures II LLC v. Tesla, Inc.</i>	<i>WDTX-1-24-cv-00884</i> (pending)	WDTX	Apr. 12, 2024

C. Lead and back-up counsel and service information

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Please address all correspondence in this proceeding to lead and back-up counsel. Petitioner consents to service in this proceeding by email at the addresses above.

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), Petitioner hereby certifies, in accordance with and reliance on the word count provided by the word-processing system used to prepare this Petition, that the number of words in this paper is 13,985. Pursuant to 37 C.F.R. § 42.24(d), this word count excludes the table of contents, table of authorities, mandatory notices under § 42.8, certificate of service, certificate of word count, appendix of exhibits, and any claim listing.

Dated: November 21, 2024

/Scott T. Jarratt/
Scott T. Jarratt
Lead Counsel for Petitioner
Registration No. 70,297

CERTIFICATE OF SERVICE

The undersigned certifies that, in accordance with 37 C.F.R. § 42.6(e) and 37 C.F.R. § 42.105, service was made on Patent Owner as detailed below.

Date of service November 21, 2024

Manner of service FEDERAL EXPRESS

Documents served Petition for *Inter Partes* Review Under 35 U.S.C. § 312 and 37 C.F.R. § 42.104 of U.S. 10,952,153;
Petitioner's Power of Attorney
Petitioner's Exhibit List;
Exhibits 1001-1016.

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Lead Counsel for Petitioner
Registration No. 70,297

CLAIM APPENDIX

Claim	Apparatus	Claim	Method
1.0	A user equipment (UE) comprising:	7.0	A method performed by a user equipment (UE), the method comprising:
1.1	a receiver, the receiver configured to receive broadcast information including a plurality of bits,	7.1	receiving, by the UE, broadcast information including a plurality of bits,
1.2	wherein each of the plurality of bits indicates a respective time interval that physical shared channel resources are utilized to signal channels; and	7.2	wherein each of the plurality of bits indicates a respective time interval that physical shared channel resources are utilized to signal channels;
1.3	a processor, the processor communicatively coupled to the receiver and		
1.4	configured to monitor the signaled channels in indicated time intervals, to determine whether signaling information for the UE is present based on an identification of the UE,	7.3 and 7.4	monitoring, by the UE, the signaled channels in indicated time intervals; determining, by the UE, whether signaling information for the UE is present based on an identification of the UE; and

	and		
1.5	to process the signaling information in response to the determination that signaling information for the UE is present.	7.5	processing, by the UE, the signaling information in response to the determination that signaling information for the UE is present.
2	The UE of claim 1, wherein the respective time interval or each indicated time interval is part of a shared frame that is allocated by a network device.	8	The method of claim 7, wherein the respective time interval or each indicated time interval is part of a shared frame that is allocated by a network device.
3	The UE of claim 1, wherein the broadcast information is received on a broadcast channel.	9	The method of claim 7, wherein the broadcast information is received on a broadcast channel.
4	The UE of claim 1, wherein the respective time interval or each indicated time interval is two or more timeslots.	10	The method of claim 7, wherein the respective time interval or each indicated time interval is two or more timeslots.
5	The UE claim 1, wherein the UE powers down radio circuitry outside of the indicated time intervals.	11	The method claim 7, wherein the UE powers down radio circuitry outside of the indicated time intervals.
6	The UE of claim 1, wherein	12	The method of claim 7, wherein

	the identification of the UE is assigned by a network device to decode the signaling information.		the identification of the UE is assigned by a network device to decode the signaling information.
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