

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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HUAWEI TECHNOLOGIES CO. LTD,  
Petitioner,

v.

NOKIA SOLUTIONS AND NETWORKS OY,  
Patent Owner.

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Case IPR2017-01540  
Patent 9,185,688

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**PATENT OWNER PRELIMINARY RESPONSE**

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## I. INTRODUCTION

Huawei Technologies Co. Ltd. (“Petitioner”) petitions for *inter partes* review under of Claims 1-24, 37-40, and 42-48 of U.S. Patent No. 9,185,688 (“the 688 Patent”), which is owned by Nokia Solutions and Networks Oy (“Patent Owner”). Each of the cited references was cited to the examiner during prosecution of the 688 Patent, and the references cited by Petitioner fail to anticipate or render obvious multiple claim elements of each challenged claim. For example, none of the references cited by Petitioner disclose “a sequence that is unmodulated via a modulation scheme used for the acknowledgement data,” which is an element that is present in each independent claim of the 688 Patent.

Petitioner’s argument with regard to this element is based on an assumption that all reference signals are unmodulated. This argument is fundamentally flawed because, in LTE alone, there are multiple references signals that are modulated and were modulated at the time of the invention that led to the 688 Patent. For this and several other reasons, Petitioner has thus failed to meet its burden under 37 C.F.R. § 42.108(c) of establishing a reasonable likelihood of success that the challenged claims would be unpatentable in view of the cited references. Accordingly, Patent Owner requests that the Board not institute *inter partes* review with respect to any of the challenged claims.

## **II. BACKGROUND**

### **A. Technology**

The inventors of the 688 Patent conceived of the invention during the development of the “Long Term Evolution” or LTE Standard by the Third Generation Partnership Project (“3GPP”). In LTE, an uplink transmission is from a user equipment (“UE”) to a component in the network referred to as an “eNodeB” or “eNB.” Downlink transmissions are from the eNodeB to the UE.

Uplink and downlink transmissions are accomplished at the physical layer using physical control and traffic channels (HUAWEI-1001, 2:3-5). Control channels are generally used to transmit control information, which is information that is used to establish and maintain connection (*id.*). Traffic channels are generally used to transmit user data, like an email or picture.

#### **1. HARQ / SR / CQI**

The following describes three types of control information transmitted on uplink control channels in LTE.

**HARQ information.** To ensure that transmissions are received correctly, the UE and eNodeB must have a mechanism for indicating the successful receipt of a transmission. In LTE, hybrid automatic repeat request (“HARQ”) data indicates whether a transmission was received correctly or not, and HARQ information is transmitted to the eNodeB on an uplink control channel (*id.* at 2:3-10). For example, a UE will indicate that it has correctly received a transmission by

transmitting an acknowledgement (“ACK”) to the eNodeB (*id.*). On the other hand, if the transmission was not received correctly, the UE will transmit a negative acknowledgment (“NACK” or “NAK”) (*id.*). The transmission of these ACK/NACK messages is thus necessary for efficient performance of LTE.

Because ACK/NACK messages must be sent for every data packet sent to each UE, it is important to transmit these messages efficiently. Otherwise, the vast amount of traffic caused by ACK/NACK messages could cause signal interference and data loss.

**Scheduling Request (“SR”).** An SR is a physical-layer message in which the UE requests resources for transmitting data (*id.* at 2:27-29). In response to an SR, the eNodeB transmits a resource grant to the UE on a downlink control channel, referred to as a physical downlink control channel (“PDCCH”) (*id.*).

**Channel quality indicator (“CQI”).** CQI is control information that indicates the strength or quality of the communication channel (*id.* at 2:14-16).

## **2. Reference Signals**

When signals such as an ACK/NACK or an SR are transmitted by the UE to the eNodeB via an uplink control channel, such as the PUCCH, the signals can be distorted as they travel over the air (NSN-2005, ¶ 19). One mechanism for addressing this distortion is to determine the characteristics of the channel through



which the signals have traveled (*id.* at ¶ 22). This process is referred to as channel estimation (*id.*).

Channel estimation can be performed through the use of reference signals (also known as pilot signals) (*id.* at ¶¶ 21-22). Reference signals are signals that are known to the eNodeB (*id.*). When the eNodeB receives a reference signal from the UE, it can compare the received, distorted reference signal to the known signal in order to determine the characteristics of the channel through which the reference signal has traveled (*id.*). This information then can be used to determine how to detect other signals that were transmitted through the same channel (*id.*). This process is referred to as coherent detection (*id.*).

Notably, the reference signals used in this channel estimation process may be modulated *or* unmodulated prior to being sent by the UE (*id.* at ¶ 23). Whether or not the reference signals are modulated or unmodulated does not matter; what matters is that the reference signals are signals that have been predefined by the eNodeB (*id.*). A modulated reference signal is still a predefined sequence (*id.*).

For example, in LTE, prior to the filing of the application that led to the 688 Patent, several modulated reference signals were defined.

For example, in the uplink, the demodulated reference signal (“DM-RS”) for a PUCCH in certain formats is actually modulated (NSN-2001, §§ 5.5.2.2.1, 5.4.1 & 5.4.2; NSN-2005, ¶¶ 25-29). The LTE specifications describe that the DM-RS is

defined using  $z(m)$ , which is set to  $d(10)$  for formats 2A and 2B of the PUCCH (NSN-2001, § 5.5.2.2.1; NSN-2005, ¶ 26). The LTE specifications describe that  $d(10)$  is a modulation symbol for the PUCCH, and it is the same modulation symbol used for the signal to be sent on the PUCCH (NSN-2001, § 5.5.2.2.1; NSN-2005, ¶¶ 26-29; *see also* NSN-2001, § 5.4.2 & table 5.4.2-1). Thus, the DM-RS is modulated (*id.*). As another example, in the downlink, a UE-specific reference signal is modulated (NSN-2001, §§ 6.10.3, 6.10.3.2 (describing that the “reference signal sequence  $r(m)$  shall be mapped to complex-valued *modulation* symbols  $a_{k,l}^{(p)}$  with  $p=5$  in a subframe”) (emphasis added); NSN-2005, ¶¶ 30-31).

Each of these signals is used for coherent detection of user data, but the signal is modulated. Thus, it was known prior to the 688 Patent that a reference signal could be modulated or unmodulated, and modulated reference signals could be used for coherent detection.

## **B. 688 Patent**

### **1. Overview**

The 688 Patent was filed on July 8, 2015, but it claims priority to a Provisional Patent Application No. 61/001,207, filed on October 30, 2007 (HUAWEI-1001, 1:8-14).

At a high level, the 688 Patent is directed to a method and apparatus for allowing a UE to transmit an ACK/NACK and either SR or CQI to the eNodeB

simultaneously on the same uplink channel. At the time of the invention of the 688 Patent, it was not yet “possible to transmit signals via multiple frequency bands” in the LTE Standard, but there were a number of control signals that needed to be transmitted (*id.* at 4:29-38). For example, the 688 Patent discloses that, in LTE, it was unclear how to transmit an SR when ACK/NACK needed to be transmitted due to the lack of resources (*id.* at 2:27-47, 4:3-17, 4:39-5:7).

The inventors of the 688 Patent sought to solve the problem created by the ever increasing number of control signals by providing a mechanism for economically transmitting certain uplink control information. For example, the 688 Patent discloses a mechanism for sending the SR and ACK/NACK or SR and CQI simultaneously on the same resource (*id.* at 2:50-55; *id.* at Fig. 5). When SR and ACK/NACK are transmitted simultaneously, the 688 Patent discloses that the ACK/NACK data is transmitted on an SR resource, which results in the combination of the SR and ACK/NACK information (*id.*). Thus, rather than requiring separate resources for the transmission of SR and ACK/NACK, the 688 Patent provides that a single resource can be used to transmit the combination of the SR and ACK/NACK.

In order to assist the eNodeB in processing the ACK/NACK data (and the SR to the extent that it is sent with the ACK/NACK), the 688 Patent discloses that

a sequence that is unmodulated via a modulation scheme used for the acknowledgement data is also transmitted (*id.* at 5:21-28).

Petitioner appears to argue that the background to the 688 Patent admits that unmodulated reference signals are transmitted with ACK/NACK signals, citing statements in column 2, lines 7-11 (Petition at 23). Contrary to Petitioner's argument, the cited portion of the 688 Patent does not state that reference signals are always unmodulated and actually discloses that the reference signals were modulated.

Specifically, the 688 Patent discloses that "ACK/NACK (only) signals are transmitted utilizing modulated CAZAC sequences (coherent)" (HUAWEI-1001, 2:6-10). A footnote to this sentence indicates that "[t]he same sequences are applied as reference signals with bandwidth allocation of one resource block" (*id.* at 12-13). Because the same sequence is used, a modulated CAZAC sequence is applied to the reference signal just as it is applied to ACK/NACK. Thus, the same technique is applied to the ACK/NACK and reference signal. Petitioner's characterization of the 688 Patent is thus incorrect.

## **2. Prosecution History**

During prosecution of the 688 Patent's parent patent, U.S. Patent No. 9,148,877 ("the 877 Patent"), the Examiner rejected all independent claims of the original patent application as anticipated by Bachl (NSN-2002, pp. 4-16). In

response to this rejection, the patentee amended all of the independent claims to include the requirement of transmitting, in addition to the acknowledgement data, “an unmodulated sequence” (NSN-2003, pp. 14-16).

After this amendment, the Examiner allowed all of the claims (NSN-2004, pp. 4-5). In the Notice of Allowability, the Examiner’s sole reason for allowance was that “the prior art does not teach or adequately suggest an unmodulated sequence in addition to acknowledgement data being sent on a physical uplink control channel” (*id.*). Thus, the “unmodulated sequence” limitation of the 877 and 688 Patents is the feature of the invention cited by the examiner that distinguished it from the prior art, including the Bachl reference cited in this Petition.<sup>1</sup>

### **C. Prior Art References**

#### **1. KwakPat883**

U.S. Patent No. 7,852,883 (“KwakPat883”) is entitled “Method of Transmitting Uplink Control Signals in Wireless Communication System”

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<sup>1</sup> Patent Owner disagrees with the examiner that any of the other features of the claims were known in the art and with any insinuation that the combination of the other features was obvious or not novel. It is notable, however, that the very feature that the examiner highlighted is what is missing from the prior art cited in the Petition.

(HUAWEI-1005, ¶ (54)). KwakPat883 generally discloses transmitting an ACK/NACK and a SR in the same subframe (*id.* at Abstract).

Although KwakPat883 discloses sending reference signals with an ACK/NACK, it does not disclose that those reference signals are unmodulated via a modulation scheme used for the acknowledgement data, as required by the independent claims of the 688 Patent (*see, e.g., id.* at 15:16-25, 16:7-16, 16:57-60).

Instead, the reference signals disclosed in KwakPat883 are modulated. The specification of KwakPat883 repeatedly states that a reference signal is sent with the ACK/NACK signal on the same channel (*see, e.g.,* HUAWEI-1005, 15:16-25, 16:7-16, 16:57-60). The specification describes that, when coherent detection is used, “the ACK/NACK signal is 1 bit and the QPSK modulation is used” for the channel (*id.* at 15:23-25). Thus, KwakPat883 describes using the same modulation (QPSK) for the ACK/NACK signal and the reference signal.

Further, KwakPat883’s specification states that the disclosed reference signals are carried on the ACK/NACK channel using a second set of SC-FDMA symbols, and the second set of SC-FDMA symbols are formed via mapping reference signal bits to states of carrier waves (frequency domain sequences) (*id.* at 6:63-7:13). This implies that the reference signals are modulated because modulation is a process mapping digital data (bits) to carrier waves (frequency sequences).

Additionally, although KwakPat883 discloses sending an ACK/NACK with an SR on the SR resource, it is silent about what happens to the resources that are not used for the transmission (*see, e.g., id.* at 11:40-12:43).

## **2. LGE**

R1-073485 (“LGE”) was submitted at 3GPP TSG RAN WG1 Meeting #50 in Athens, Greece, and is entitled “Proposed Scheduling Request (SR) structure and multiplexing with PUCCH” (HUAWEI-1013, p. 1). LGE generally discloses transmitting an ACK/NACK and an SR in the same subframe (*id.* at pp. 5-6). Although LGE discloses the transmission of reference signals with an ACK/NACK, it does not disclose that those reference signals are unmodulated via a modulation scheme used for the acknowledgement data, as required by the independent claims of the 688 Patent (*see, e.g., id.* at p. 2). Additionally, although LGE discloses sending an ACK/NACK with an SR on the SR channel, it is silent about what happens to the channels that are not used for the transmission (*see, e.g., id.* at pp. 5-6).

## **3. Bachl**

U.S. Application No. 2008/0316959 (“Bachl”) is entitled “Method of Transmitting Scheduling Requests over Uplink Channels” (HUAWEI-1011, ¶ (54)). Bachl generally discloses transmitting an SR and other control information on the same resource (*id.* at Abstract). Petitioner relies on Bachl solely for its

disclosure of certain apparatus and computer-readable medium elements (Petition at 80-94). Petitioner does not argue that Bachl discloses any other element of the asserted claims of the 688 Patent.

### **III. CLAIM CONSTRUCTION**

When considering whether to institute an *inter partes* review, the Board has indicated that it will construe claims by applying the broadest reasonable interpretation in light of the specification. 37 C.F.R. §42.100(b); *Cuozzo Speed Technologies, LLC v. Lee*, 136 S. Ct. 2131, 2142 (2016); *see also* Office Patent Trial Practice Guide, 77 Fed. Reg. 48756, 48766 (Aug. 14, 2012). There is a “heavy presumption” that a claim term carries its ordinary and customary meaning. *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir 2002). However, a “claim term will not receive its ordinary meaning if the patentee acted as his/her own lexicographer and clearly set forth a definition of the disputed claim term in either the specification or prosecution history.” *Id.*

Petitioner argues that the term “a sequence that is unmodulated via a modulation scheme used for the acknowledgement data,” which appears in claims 1, 10, 14, and 37, should be interpreted broadly enough to encompass reference signals (Petition at 19).

Based on Petitioner’s application of this construction, it is clear that Petitioner is attempting to completely read out the requirement that the sequence is



unmodulated “via a modulation scheme used for the acknowledgement data.”

Specifically, Petitioner’s attempt to construe the term broadly to cover all reference signals is improper. As described above in Section II.A.2, a reference signal can be modulated or unmodulated. A reference signal that is modulated via the same modulation scheme used for acknowledgement data would not satisfy this limitation. Thus, to determine whether any signal, including a reference signal, meets this requirement, it must be determined whether the signal was modulated via a modulation scheme used for the acknowledgement data or not.

The term “a sequence that is unmodulated via a modulation scheme used for the acknowledgement data” should thus be given its plain and ordinary meaning. This interpretation is consistent with the parties’ agreement in the district court proceeding related to the 688 Patent (HUAWEI-1029, pp. 10-11).

#### **IV. THE BOARD SHOULD NOT INSTITUTE AN *INTER PARTES* REVIEW OF THE CHALLENGED CLAIMS**

Petitioner presents redundant challenges that each fails to carry its burden of proving a likelihood that the challenged claims are unpatentable. *See* 37 C.F.R. §42.108(c). Further, Petitioner relies on prior art references (KwakPat883, LGE, and Bachl) that were before the Examiner during prosecution of the 688 Patent, and it fails to show that any of the cited references anticipate or render obvious the challenged claims. The 688 Patent was allowed over these references, and

Petitioner's redundant attempt to rely on these references in the current Petition falls flat.

**A. KwakPat883 Does Not Anticipate Any of Claims 1-2, 4-9, 37-39, and 42-45 (Ground 1A)**

Petitioner asserts that claims 1-2, 4-9, 37-39, and 42-45 are invalid under 35 U.S.C. § 102(b) based on KwakPat883 (Petition at 26-73). Thus, Petitioner must show that KwakPat883 discloses each and every element of claims 1-2, 4-9, 37-39, and 42-45. Petitioner has not shown that KwakPat883 discloses “a sequence that is unmodulated via a modulation scheme used for the acknowledgement data” or that resources not selected for transmission of SR or ACK/NACK remain unused.

**1. KwakPat883 does not disclose “a sequence that is unmodulated via a modulation scheme used for the acknowledgement data” of claims 1 and 37**

Independent claims 1 and 37 of the 688 Patent require “a sequence that is unmodulated via a modulation scheme used for the acknowledgement data” to be transmitted along with the acknowledgement data (HUAWEI-1001, 15:29-33, 18:22-25). Petitioner argues that KwakPat883 discloses this claim element because it discloses that reference signals are sent with acknowledgement data (Petition at 33-34). KwakPat883, however, does not disclose that these reference signals are “unmodulated via a modulation scheme used for the acknowledgement data.” Indeed, the word “unmodulated” does not appear in KwakPat883 at all. Thus, the

Petition has failed to show that claims 1 and 37 and dependent claims 2, 4-9, 38-39, and 42-45 are anticipated by KwakPat883.

Petitioner does not argue that there is an explicit disclosure in KwakPat883 of an unmodulated reference signal. Instead, the Petition appears to imply that a reference signal cannot be modulated (Petition at 23-24, 33-37). As described above, however, reference signals can be modulated. For example, in LTE, prior to the filing of the provisional application that led to the 688 Patent, several modulated reference signals were defined, including the DM-RS for a Format 2A or 2B PUCCH and a UE-specific reference signal (*see supra* Section II.A.2). The use of modulated reference signals in LTE prior to the 688 Patent shows that reference signals do not have to be unmodulated to provide the necessary channel information for coherent detection (*id.*). Thus, a disclosure of a reference signal alone does not indicate that the reference signal is unmodulated.

Petitioner thus should have demonstrated that the particular reference signals disclosed in KwakPat883 are unmodulated, but it failed to do so. This failure stems from the fact that the reference signals disclosed in KwakPat883 are actually modulated. The specification of KwakPat883 repeatedly states that a reference signal is sent with the ACK/NACK signal on the same channel (*see, e.g.,* HUAWEI-1005, 15:16-25, 16:7-16, 16:57-60). The specification describes that, when coherent detection is used, “the ACK/NACK signal is 1 bit and the QPSK

modulation is used” for the channel (*id.* at 15:23-25). Thus, KwakPat883 describes using the same modulation (QPSK) for the ACK/NACK signal and the reference signal.

Further, KwakPat883’s specification states that the disclosed reference signals are carried on the ACK/NACK channel using a second set of SC-FDMA symbols, and the second set of SC-FDMA symbols are formed via mapping reference signal bits to states of carrier waves (frequency domain sequences) (*id.* at 6:63-7:13). This implies that the reference signals are modulated because modulation is a process mapping digital data (bits) to carrier waves (frequency sequences).

Petitioner has thus not met its burden of proving that the requirement of “a sequence that is unmodulated via a modulation scheme used for the acknowledgement data” is disclosed by KwakPat883.

## **2. KwakPat883 does not disclose an additional limitation of claim 37**

Claim 37 also requires that, “based on whether a scheduling request is desired to be transmitted by the user equipment, placing at least one of an acknowledgment/negative acknowledgement and a channel quality indicator that is desired to be transmitted by the user equipment *in one of the resources and leaving at least one other resource unused*” (HUAWEI-1001, 18:17-22).

The Petition argues that this limitation is disclosed because KwakPat883 discloses different “paths” (Petition at 58). Although different paths are described in KwakPat883, there is no disclosure in KwakPat883 that a resource that is not selected for a transmission is not used for some other purpose.

For example, KwakPat883 describes three paths, each of which denotes a different transmission (HUAWEI-1005, 11:40-45). For example, KwakPat883 discloses: “Referring to FIG. 9, a path (1) denotes transmission of the SR. A path (2) denotes transmission of the SR and an ACK/NACK signal. A path (3) denotes transmission of the ACK/NACK signal” (*id.*). KwakPat883 then describes the resources that could be used for each of these transmissions, but KwakPat883 never describes what happens to the resources that were not used for a transmission (*see id.* at 11:46-12:43).

It is possible that the resources that were not used for transmission of an SR or ACK/NACK signal were used for a different purpose, such as a CQI signal (*id.* at 5:46-51 (“The control signal includes a plurality of signals other than the user data. That is, the control signal includes an acknowledgement (ACK)/negative-acknowledgement (NACK) signal, a channel quality indicator (CQI), a preceding matrix index (PMI), a rank indicator (RI), a scheduling request, etc.”)). Use of the resource for other purposes is possible because LTE allows dynamic allocation of

resources (*see id.* at 1:65-2:7 (describing dynamic allocation of uplink resources by the base station)).

Accordingly, KwakPat883 does not disclose that at least one other resource remains unused as required by claim 37, nor has the Petition shown that this disclosure is inherent. KwakPat883 thus does not anticipate claim 37.

### **3. KwakPat883 does not anticipate claim 7**

Claim 7 of the 688 Patent depends from claim 1 and adds the requirement that: “the physical uplink control channel comprises an unmodulated sequence, where the unmodulated sequence comprises reference signals and the acknowledgement data comprises a BPSK/QPSK modulated sequence” (HUAWEI-1001, 15:52-56). As described above with respect to claims 1 and 37, KwakPat883 does not disclose reference signals that are unmodulated (*see supra* Section IV.A.1). For the same reasons, KwakPat883 does not disclose the requirement of an unmodulated sequence comprising a reference signal in claim 7.

### **4. KwakPat883 does not anticipate claim 39**

Claim 39 depends from claim 37. Claim 39 provides specific requirements regarding whether a “scheduling resource” or “at least one other resource” is used to transmit acknowledgement and negative acknowledgment (HUAWEI-1001, 18:29-41). Claim 39, however, expressly requires that either the scheduling resource or “at least one other resource” remains unused (*id.*).

Similar to the discussion of claim 37 above, the Petition argues that this limitation is disclosed because KwakPat883 discloses different “paths” (Petition at 58). As described above with respect to claim 37, although different paths are described in KwakPat883, there is no disclosure in KwakPat883 that a path or resource that is not selected for a transmission is not used for some other purpose (*see* HUAWEI-1005, 11:46-12:43).

Instead, it is possible that the resources that were not used for transmission of an SR or ACK/NACK were used for a different purpose, such as a CQI signal (*id.* at 5:46-51 (“The control signal includes a plurality of signals other than the user data. That is, the control signal includes an acknowledgement (ACK)/negative-acknowledgement (NACK) signal, a channel quality indicator (CQI), a precoding matrix index (PMI), a rank indicator (RI), a scheduling request, etc.”)). Use of the resource for other purposes is possible because LTE allows dynamic allocation of resources (*see id.* at 1:65-2:7 (describing dynamic allocation of uplink resources by the base station)).

Accordingly, KwakPat883 does not disclose that either the at least one other resource or scheduling resource remains unused as required by claim 39, nor has the Petition shown that this disclosure is inherent. KwakPat883 thus does not anticipate claim 39.

## **5. KwakPat883 does not anticipate claim 43**

Independent claim 43 of the 688 Patent requires that there be “no need to specify a separate modulation or multiplexing operation used for transmission of the acknowledgement data with the scheduling request, from a modulation or multiplexing operation used for transmission of the acknowledgement on another resource” (HUAWEI-1001, 19:7-12). KwakPat883 fails to disclose this claim element.

Petitioner argues that this element is disclosed by KwakPat883 through incorporation of its provisional because the provisional discloses that the same demodulation method is used for ACK/NACK information and the ACK/NACK channel (Petition at 71-72 (citing HUAWEI-1007 at 59:16-20 (“the ACK/NACK information is obtained by the same coherent demodulation as the existing demodulation method of the ACK/NACK channel”))). The ACK/NACK channel is used to transmit ACK/NACK information, and thus the disclosure fails to show that the modulation or multiplexing operation used for transmission on *another* resource is used for the acknowledgement data with a scheduling request, as required by the claims.

Petitioner also argues that KwakPat883 discloses this claim element because, when transmitting an ACK/NACK signal through a scheduling request channel, “existing resources can be utilized without having to reserve additional



resources” (Petition at 72). But merely stating that existing resources can be utilized does not specifically disclose that there is “no need to specify a separate modulation or multiplexing operation used for transmission of the acknowledgement data with the scheduling request, from a modulation or multiplexing operation used for transmission of the acknowledgement on another resource.” Instead, Petitioner’s arguments are a thinly veiled attempt to cast an obviousness argument as anticipation through the eyes of POSITA.<sup>2</sup>

Because KwakPat883 does not expressly disclose the limitation, Petitioner’s conclusory statement that the disclosure in KwakPat883 satisfies this claim element is insufficient to show anticipation under 35 U.S.C. § 102. *See Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

**B. LGE Does Not Anticipate Any of Claims 1-2, 4-9, 37-39, and 42-45 (Ground 1B)**

Petitioner asserts that claims 1-2, 4-9, 37-39, and 42-45 are invalid under 35 U.S.C. § 102(b) based on LGE (Petition at 26-73). Patent Owner respectfully requests that institution be denied with respect to Ground 1B because LGE fails to teach each and every element of claims 1-2, 4-9, 37-39, and 42-45. Petitioner’s

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<sup>2</sup> Acknowledging the deficiencies of its argument, Petitioner does make an obviousness argument, but the argument is part of Ground 3A addressed below.

arguments with respect to LGE are similar to KwakPat883 and are thus deficient for many of the same reasons.

**1. LGE does not disclose “a sequence that is unmodulated via a modulation scheme used for the acknowledgement data” of claims 1 and 37**

As discussed above, independent claims 1 and 37 of the 688 Patent require “a sequence that is unmodulated via a modulation scheme used for the acknowledgement data” to be transmitted along with the acknowledgement data (HUAWEI-1001, 15:29-33, 18:22-25). Like KwakPat883, LGE does not disclose this claim element, and thus the Petition has failed to show that claims 1 and 37 and dependent claims 2, 4-9, 38-39, and 42-45 are anticipated by LGE.

At no point in LGE does it explicitly disclose unmodulated reference signals being sent with acknowledgement data, and Petitioner does not argue otherwise. Instead, Petitioner argues that LGE discloses reference signals and obtaining ACK/NACK information “by coherent detection” (Petition at 36-37). The Petitioner then claims that “[a] POSITA would readily understand that coherent detection of the ACK/NACK requires reference signals (RS) to be transmitted with the ACK/NACK” (*id.* at 37).

Notably, the Petition does not argue that coherent detection always requires unmodulated reference signals, nor does it state that a reference signal must always

be unmodulated. This alone is fatal to the Petition, as it has failed to address an aspect of the claims.

Moreover, as described above, reference signals can be modulated (*see supra* Section II.A.2). For example, in LTE, prior to the filing of the provisional application that led to the 688 Patent, several modulated reference signals were defined, including the DM-RS for a Format 2A or 2B PUCCH and a UE-specific reference signal (*id.*). The use of modulated reference signals in LTE prior to the 688 Patent shows that reference signals do not have to be unmodulated to provide the necessary channel information for coherent detection (*id.*).

Thus, Petitioner had to show that the particular reference signals disclosed in LGE are unmodulated, and it failed to do so. Petitioner has thus failed to meet its burden of showing that LGE discloses this claim element, and LGE does not anticipate claims 1 or 37 or any of the challenged dependent claims.

## **2. LGE does not disclose an additional limitation of claim 37**

Claim 37 also requires that, “based on whether a [SR] is desired to be transmitted by the user equipment, placing at least one of an acknowledgment/negative acknowledgement and a channel quality indicator that is desired to be transmitted by the user equipment *in one of the resources and leaving at least one other resource unused*” (HUAWEI-1001, 18:17-22).

The Petition argues that this limitation is disclosed because LGE discloses, in Figure 5, placing the ACK/NACK signal on one of the paths, which leaves a resource on “path (a)” unused (Petition at 60-61).

For Figure 5, LGE describes that two separate channels can be utilized by a UE to respectively transmit ACK/NACK or SR signals (HUAWEI-1013, p. 5). LGE describes that, when ACK/NACK and SR transmissions occur simultaneously, the ACK/NACK information is not transmitted on the ACK/NACK channel but is diverted to the SR channel (*id.*). Although different channels are described in LGE, there is no disclosure in LGE of how the resources for the ACK/NACK channel are used when a transmission occurs on the SR channel. Rather, the LGE leaves open the issue of whether the resources are used for some other purpose, such as transmission of a CQI signal.<sup>3</sup>

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<sup>3</sup> For example, KwakPat883, which Petitioner contends that a POSITA would consider along with LGE, discloses: “The control signal includes a plurality of signals other than the user data. That is, the control signal includes an acknowledgement (ACK)/negative-acknowledgement (NACK) signal, a channel quality indicator (CQI), a precoding matrix index (PMI), a rank indicator (RI), a scheduling request, etc.” (HUAWEI-1005, 5:46-51).

Accordingly, LGE does not disclose that at least one other resource remains unused as required by claim 37, nor has the Petition shown that this disclosure is inherent. LGE thus does not anticipate claim 37.

### **3. LGE does not anticipate claim 7**

Claim 7 of the 688 Patent states: “The method of claim 1, where the physical uplink control channel comprises an unmodulated sequence, where the unmodulated sequence comprises reference signals and the acknowledgement data comprises a BPSK/QPSK modulated sequence” (HUAWEI-1001, 15:52-56). As described above with respect to claims 1 and 37, LGE does not disclose reference signals that are unmodulated (*see supra* Section IV.B.1). For the same reasons, LGE does not disclose the requirement of an unmodulated sequence comprising a reference signal in claim 7.

### **4. LGE does not anticipate claim 39**

Claim 39 depends from claim 37. Claim 39 provides specific requirements regarding whether a “scheduling resource” or “at least one other resource” is used to transmit acknowledgement and negative acknowledgment (HUAWEI-1001, 18:29-41). Claim 39, however, expressly requires that either the scheduling resource or “at least one other resource” remains unused (*id.*).

Similar to the discussion of claim 37 above, the Petition argues that this limitation is disclosed because LGE discloses different channels with respect to

Figure 5 (Petition at 62-69). As described above with respect to claim 37, although different channels are described in LGE, there is no disclosure in LGE that the resources for a particular channel that is not selected for a transmission are not used for some other purpose.

Instead, it is possible that the resources that were not used for transmission of an SR or ACK/NACK were used for a different purpose, such as a CQI signal (HUAWEI-1005, 5:46-51 (“The control signal includes a plurality of signals other than the user data. That is, the control signal includes an acknowledgement (ACK)/negative-acknowledgement (NACK) signal, a channel quality indicator (CQI), a precoding matrix index (PMI), a rank indicator (RI), a scheduling request, etc.”)). Use of the resource for other purposes is possible because LTE allows dynamic allocation of resources (*see* HUAWEI-1005 at 1:65-2:7 (describing dynamic allocation of uplink resources by the base station)).

Accordingly, LGE does not disclose that either the at least one other resource or scheduling resource remains unused as required by claim 39, nor has the Petition shown that this disclosure is inherent. LGE thus does not anticipate claim 39.

## **5. LGE does not anticipate claim 43**

Independent claim 43 requires that there be “no need to specify a separate modulation or multiplexing operation used for transmission of the

acknowledgement data with the scheduling request, from a modulation or multiplexing operation used for transmission of the acknowledgement on another resource” (HUAWEI-1001, 19:7-12). LGE fails to disclose this claim element.

Petitioner argues that LGE discloses this claim element because LGE states that the scheduling request channel and the ACK/NACK channel are compatible (Petition at 72-73). But merely stating that the two channels are compatible does not disclose that there is “no need to specify a separate modulation or multiplexing operation used for transmission of the acknowledgement data with the scheduling request, from a modulation or multiplexing operation used for transmission of the acknowledgement on another resource.” Petitioner’s conclusory statement that the disclosure in LGE satisfies this claim element is insufficient. Instead, Petitioner’s arguments are a thinly veiled attempt to cast an obviousness argument as anticipation through the eyes of POSITA.<sup>4</sup>

Because LGE does not expressly disclose the limitation, Petitioner’s conclusory statement that the disclosure in LGE satisfies this claim element is insufficient to show anticipation under 35 U.S.C. § 102. *See Verdegaaal Bros.*, 814 F.2d at 631.

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<sup>4</sup> Acknowledging the deficiencies of its argument, Petitioner does make an obviousness argument, but the argument is part of Ground 3B addressed below.

**C. LGE Does Not Anticipate Either of Claims 3 and 40  
(Ground 2A)**

Petitioner asserts that claims 3 and 40 are invalid under 35 U.S.C. § 102(b) based on LGE (Petition at 73-75). Claim 3 is dependent upon claim 1, and claim 40 is dependent upon claim 37. As discussed above, LGE does not disclose every element of claim 1 or claim 37, and thus institution should be denied as to Ground 2A (*see supra* at Sections IV.B.1 & IV.B.2).

**D. KwakPat883 and LGE Do Not Render Obvious Either of  
Claims 3 and 40 (Ground 2B)**

Petitioner asserts that claims 3 and 40 are obvious in view of the combination of KwakPat883 and LGE (Petition at 75-78). However, the combination in Ground 2B fails to disclose, teach, or suggest each and every element of claims 3 and 40.

Claim 3 is dependent upon claim 1, and claim 40 is dependent upon claim 37. As discussed above, neither KwakPat883 nor LGE discloses every element of independent claims 1 and 37 (*see supra* Sections IV.A.1, IV.A.2, IV.B.1, & IV.B.2). Nor does the combination of the two references disclose every element of claims 1 and 37, as each reference fails to disclose the same limitations (*id.*). Thus institution should be denied as to Ground 2B (*see supra* at Sections IV.A.1, IV.A.2, IV.B.1 & IV.B.2).



**E. KwakPat883 Does Not Render Obvious Any of Claims 43-45 (Ground 3A)**

Petitioner argues that, to the extent that the Board does not agree that KwakPat883 discloses element D of claim 43, which is addressed in Section IV.A.5 above, KwakPat883 renders that claim element obvious (Petition at 78).

Element D of claim 43 requires that there is “no need to specify a separate modulation or multiplexing operation used for transmission of the acknowledgement data with the scheduling request, from a modulation or multiplexing operation used for transmission of the acknowledgement on another resource” (HUAWEI-1001, 19:7-12). For its obviousness argument, Petitioner merely reiterates its argument from Ground 1A that KwakPat883 discloses (or renders obvious) this claim element because KwakPat883 states that, when transmitting an ACK/NACK signal through a scheduling request channel, “existing resources can be utilized without having to reserve additional resources” (Petition at 78). Petitioner does not explain how or why a person of skill in the art would read this disclosure to render obvious the claim element.

Moreover, the only support for this argument is the declaration of its expert, but the expert declaration merely parrots the conclusions of the Petition. This testimony is thus entitled to little weight. *See Kinetic Techs., Inc. v. Skyworks Solutions, Inc.*, IPR2014-00529, Paper No. 8 at 15 (P.T.A.B. Sept. 23, 2014) (“Merely repeating an argument from the Petition in the declaration of a proposed

expert does not give that argument enhanced probative value. . . . The Declaration does not explain the ‘how,’ ‘what,’ and ‘why’ of the proposed combination of references”).

Petitioner has thus failed to meet its burden under 37 C.F.R. § 42.108(c) of establishing a reasonable likelihood of success that independent claim 43, and claims 44 and 45 that depend therefrom, would be unpatentable in view of KwakPat883. Accordingly, Patent Owner requests that the Board not institute *inter partes* review with respect to Ground 3A.

**F. LGE Does Not Render Obvious Any of Claims 1-9, 37-40, and 42-45 (Ground 3B)**

Petitioner’s only obviousness argument with respect to LGE is that, to the extent that the Board does not agree that LGE discloses element C of claim 1, which is addressed in Section IV.B.1 above, LGE renders that claim element obvious (Petition at 79).<sup>5</sup> The relevant portion of claim 1 is the requirement of “a sequence that is unmodulated via a modulation scheme used for the acknowledgement data.”

Petitioner argues that this element is rendered obvious because LGE discloses transmission of reference signals in addition to ACK/NACK, and it

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<sup>5</sup> It is notable that the Petition does not provide any analysis of whether claim 37 is rendered obvious.

discloses coherent detection (Petition at 78-79). This argument rests on the assumption that coherent detection somehow requires the reference signal to be unmodulated.

As described above, however, reference signals do not have to be unmodulated for coherent detection (*see supra* Section II.A.2). For example, in LTE, prior to the filing of the provisional application that led to the 688 Patent, several modulated reference signals were defined, including the DM-RS for a Format 2A or 2B PUCCH and a UE-specific reference signal (*id.*). The use of modulated reference signals in LTE prior to the 688 Patent also shows that reference signals do not have to be unmodulated to provide the necessary channel information for coherent detection (*id.*). Thus, Petitioner must show that the particular reference signals disclosed in LGE are unmodulated.

Petitioner did not do so, and thus Petitioner's argument is premised on an incorrect assumption. For this reason and for the reasons stated earlier with respect to Ground 1B, Petitioner has failed to meet its burden under 37 C.F.R. § 42.108(c) of establishing a reasonable likelihood of success that claims 1-9, 37-40, and 42-45 are unpatentable in view of LGE. Accordingly, Patent Owner requests that the Board not institute *inter partes* review with respect to Ground 3B.

**G. KwakPat883 and Bachl Do Not Render Obvious Any of Claims 10-11, 13-15, 17-24, and 46-48 (Ground 4A)**

Claims 10-11, 13-15, 17-24, and 46-48 are computer-readable and apparatus claims that recite identical language to method claims 1-2, 4-9, 37-40, and 42-45 discussed above. This is demonstrated by the fact that Petitioner merely cites back to its arguments for the method claims for each of the limitations of the apparatus and computer-readable medium claims (*see* Petition at 80-94). Petitioner argues that KwakPat883 in view of Bachl renders these claims obvious because Bachl discloses the apparatus and computer-readable medium elements disclosed in the claims (*id.*). Even assuming that this is true, however, the combination of KwakPat883 and Bachl cannot render obvious any of claims 10-11, 13-15, 17-24, and 46-48 because KwakPat883 fails to disclose every claim element of independent claims 10, 14, and 46 for the same reasons that it fails to disclose every claim element of independent claims 1, 37, and 43 (*see supra* at Sections IV.A.1, IV.A.2, & IV.A.5), and Petitioner does not even attempt to argue that Bachl independently discloses any of the missing claim elements. Accordingly, Patent Owner requests that the Board not institute *inter partes* review with respect to Ground 4A.

**H. LGE and Bachl Do Not Render Obvious Any of Claims 10-11, 13-15, 17-24, and 46-48 (Ground 4B)**

Similarly, Petitioner argues that LGE in view of Bachl renders obvious claims 10-11, 13-15, 17-24, and 46-48 because Bachl discloses the apparatus and computer-readable medium elements disclosed in the claims (Petition at 80-94). Again, however, even assuming that this is true, the combination of LGE and Bachl cannot render obvious any of claims 10-11, 13-15, 17-24, and 46-48 because LGE fails to disclose every claim element of independent Claims 10, 14, and 46 for the same reasons that it fails to disclose every claim element of independent Claims 1, 37, and 43 (*see supra* Sections IV.B.1, IV.B.2, & IV.B.5), and Petitioner does not even attempt to argue that Bachl independently discloses any of the missing claim elements. Accordingly, Patent Owner requests that the Board not institute *inter partes* review with respect to Ground 4B.

**I. LGE and Bachl Do Not Render Obvious Either of Claims 12 and 16 (Ground 5A)**

Claims 12 and 16 are dependent upon claims 10 and 14, respectively, and claims 12 and 16 are apparatus and computer-readable medium claims that recite identical language to method claims 3 and 40 discussed above. Again, this is demonstrated by the fact that Petitioner merely cites back to its arguments regarding claims 3 and 40 for the limitations of claims 12 and 16 (Petition at 94-95). Petitioner argues that LGE in view of Bachl renders obvious claims 12 and 16

because Bachl discloses the apparatus and computer-readable medium elements disclosed in the claims (*id.*). Even assuming that is true, however, the combination of LGE and Bachl cannot render obvious claims 12 and 16 because LGE does not disclose every element of independent claims 10 and 14, on which those claims rely (*see supra* Section IV.H), and Petitioner does not even attempt to argue that Bachl independently discloses the missing claim elements. Accordingly, Patent Owner requests that the Board not institute *inter partes* review with respect to Ground 5A.

**J. KwakPat883, LGE, and Bachl Do Not Render Obvious Either of Claims 12 and 16 (Ground 5B)**

Similarly, Petitioner argues that KwakPat883 in view of LGE and Bachl renders obvious claims 12 and 16 because Bachl discloses the apparatus and computer-readable medium elements disclosed in the claims (Petition at 95-96). Again, however, even assuming that this is true, the combination of KwakPat883, LGE, and Bachl cannot render obvious claims 12 and 16 because neither KwakPat883 nor LGE (nor the combination of the two) discloses every claim element of independent Claims 10 and 14, on which those claims rely (*see supra* Sections IV.G & IV.H), and Petitioner does not even attempt to argue that Bachl independently discloses any of the missing claim elements. Accordingly, Patent Owner requests that the Board not institute *inter partes* review with respect to Ground 5B.

## V. CONCLUSION

For at least the foregoing reasons, Petitioner has failed to meet the burden under 37 C.F.R. § 42.108(c) of showing a reasonable likelihood of success that any of claims 1-24, 37-40, and 42-48 of the 688 Patent would be unpatentable based on its challenges. As such, Patent Owner respectfully requests that the Board deny institution of an *inter partes* review.

Dated: October 18, 2017

Respectfully submitted,

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**CERTIFICATION UNDER 37 C.F.R. § 42.24**

Under the provisions of 37 CFR § 42.24, the undersigned hereby certifies that the word count for the foregoing Patent Owner Preliminary Response totals 6,993 words, which is less than the 14,000 allowed under 37 CFR § 42.24(a)(i).

Dated: October 18, 2017

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**Certificate of Service**

Pursuant to 37 C.F.R. §§ 42.8 and 42.6(e), the undersigned hereby certifies that the foregoing Patent Owner Preliminary Response and its exhibits were served electronically in their entirety on the following:

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