

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,
Petitioner

v.

ASUS TECHNOLOGY LICENSING INC.,
Patent Owner

IPR2024-01036
Patent No. 11,291,052

PATENT OWNER PRELIMINARY RESPONSE

Mail Stop “PATENT BOARD”
Patent Trial and Appeal Board
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

TABLE OF CONTENTS

	<u>Page</u>
I. INTRODUCTION	1
II. TECHNOLOGY BACKGROUND.....	3
A. The '052 Patent.....	3
1. Challenged Claims	6
2. Prosecution History	7
(a) '985 Application.....	12
(b) European Patent Application EP17183827.9.....	12
B. Alleged Prior Art.....	14
1. Tang (EX1004).....	14
2. Lohr (EX1005).....	16
3. Tirronen (EX1006).....	18
III. CLAIM CONSTRUCTION.....	21
IV. PETITIONER HAS NOT SHOWN A REASONABLE LIKELIHOOD OF SUCCESS FOR GROUND 1.....	21
A. Tang Does Not Disclose Or Suggest “The UE Performs A Single (TB) Transport Block of Msg3 Transmission To The Network According To The TTI Information of the Msg3”.....	21
B. Lohr Does Not Disclose Or Suggest “The UE Performs A Single (TB) Transport Block of Msg3 Transmission To The Network According To The TTI Information of the Msg3”.....	25
V. PETITIONER HAS NOT SHOWN A REASONABLE LIKELIHOOD OF SUCCESS FOR GROUND 2.....	29

A.	Tirronen Does Not Teach Or Suggest “The UE Performs A Single (TB) Transport Block of Msg3 Transmission To The Network According To The TTI Information of the Msg3”	29
VI.	CONCLUSION	30

TABLE OF AUTHORITIES

	<u>Page(s)</u>
<u>Statutes</u>	
35 U.S.C. §102.....	15, 18

LIST OF EXHIBITS

Exhibit No.	Patent Owner's Exhibits
Ex. 2001	<i>Reserved</i>
Ex. 2002	<i>Reserved</i>
Ex. 2003	3GPP TSG-RAN-WG2 #56bis, R2-070212, titled "RACH procedure," January 15-19, 2007 ("R2-070212")
Ex. 2004	Stefania Sessia, Issam Toufik and Matthew Baker, "LTE The UMTS Long Term Evolution From Theory To Practice," John Wiley & Sons Ltd., 2011, 2 nd Ed. ("UMTS Long Term Evolution")

I. INTRODUCTION

The '052 Patent and the challenged claims are directed to the use of “short TTI” (Transmission Time Interval) to “accelerate [LTE’s] random access procedure.” EX1001 ['052 Patent], 8:49-57; cls 1, 8. In conventional 3GPP LTE, the TTI has a standard length of 1 millisecond. EX1004 [Tang], [0003]. The '052 Patent proposes shortening this standard length to save time in completing LTE’s random access procedure. *See, e.g.*, EX1001 ['052 Patent], 9:9-18, 13:60-14:3; Figs. 7, 11.

The asserted references are fundamentally different. Lohr and Tirronen both disclose ***extending*** TTI to send multiple redundant (i.e., not a single) transport blocks for UEs that have difficulty transmitting and/or receiving communications of a conventional random access procedure. That is, Lohr and Tirronen are both directed to extending TTI (or “TTI bundling) rather than shortening TTI as the '052 Patent teaches. Thus, both Lohr and Tirronen disclose transmitting more than one transport block as part of the TTI bundling.

While Tang discusses short TTI, it does not discuss using short TTI for the purpose disclosed in the '052 Patent (e.g., accelerating LTE random access procedures) and does not discuss how it transmits transport blocks using Msg3. Instead, Tang simply provides a method for configuring short TTI to address the

alleged problem that “there is no method for configuring a short TTI.” EX1004 [Tang], [0005].

Because the asserted references do not teach that “the UE performs a single (TB) transport block of Msg3 transmission to the network according to the TTI information of the Msg3”, Petitioner mixes embodiments and relies on the asserted references’ discussion of conventional, contention-based, random access LTE Msg3 transmissions (“legacy” LTE) as disclosing the “single (TB) transport block” limitation. In those prior existing conventional transmissions, the TTI duration and start timing offset are fixed. Thus, there is no need for the TTI information to include a TTI duration or start timing offset. The Msg3 transmission in conventional, contention-based random access LTE Msg3 transmissions is therefore not performed “according to the TTI information of the Msg3” because the claimed TTI information must include a TTI duration and start timing offset.

Accordingly, none of the asserted references disclose or suggest claims 1 or 8. The Board should not institute because there is no reasonable likelihood that the petitioner would prevail with respect to any challenged claim.

II. TECHNOLOGY BACKGROUND

A. The '052 Patent

The '052 Patent is directed to “improving Msg3 transmission of random access procedure in a wireless communication system. '052 Patent, Title, 1:17-20. At the time of invention, the 3GPP standards organization was undertaking standardization activities with respect to the Evolved Universal Terrestrial Radio Access Network, or “E-UTRAN” air interface. EX1001 ['052 Patent], 1:32-40. “[C]hanges to the current body of 3GPP standard[s were] being submitted and considered to evolve and finalize” 5G standards. *Id.*, 1:36-40. Thus, the wireless communications systems of the '052 Patent were developed in the context of E-UTRAN and may be “designed to support one or more standards such as the standard offered by” 3GPP. EX1001 ['052 Patent], 2:46-61. Accordingly, the '052 Patent incorporates by reference several 3GPP standards documents. *Id.*

The '052 Patent is concerned with random access procedure features to be incorporated into 5G. EX1001 ['052 Patent], 1:17-20, 1:51-54. In particular, the '052 Patent discusses incorporating a dynamic transmission time interval (“TTI”) into the contention random access procedure. *Id.*, 8:31-57. “The contention random access procedure consists of 4 steps, including: Msg1, Msg2, Msg3, and Msg4.” *Id.*, 8:32-34. The four steps of the contention random access procedure (referred to

in the '052 Patent as Msg1, Msg2, Msg3 and Msg4) is illustrated at '052 Patent

Fig. 5:

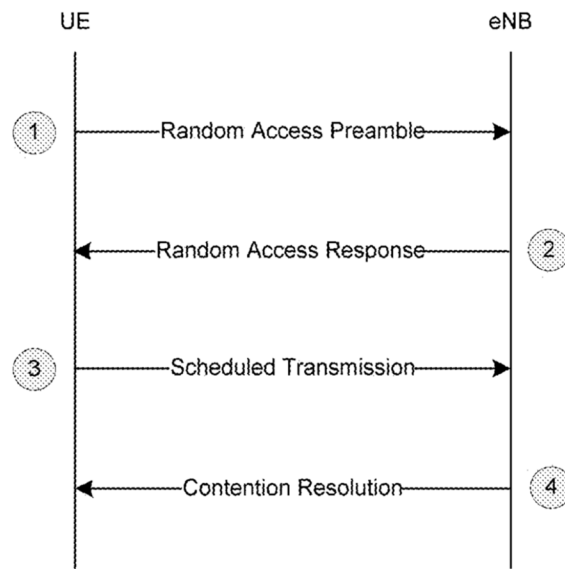


FIG. 5 (PRIOR ART)

The '052 Patent discusses the 3GPP technical contribution R2-163445, which introduced the concept of a “short TTI” in addition to normal TTI for use during the TCP slow start process. EX1001 ['052 Patent], 8:42-48. 3GPP R2-163445 proposed “short TTI can be used to accelerate TCP slow start process, and long TTI can be used in steady transmission rate state for reduce control signaling overhead.” EX1001 ['052 Patent], 8:45-48. That is, R2-163445 discloses that the duration of a TTI can be dynamically shortened to accelerate the TCP slow start process.

The '052 Patent builds on this concept, disclosing that, in addition to TCP transmission, short TTI “can also be used to accelerate random access procedure and how to achieve dynamic TTI change in random access.” *Id.*, 8:49-52. “If short TTI applies to Msg3 transmission, the average random access latency could be reduced due to early start to monitor Msg4.” *Id.*, 9:9-11. This is illustrated in '052 Patent Fig. 7, below:

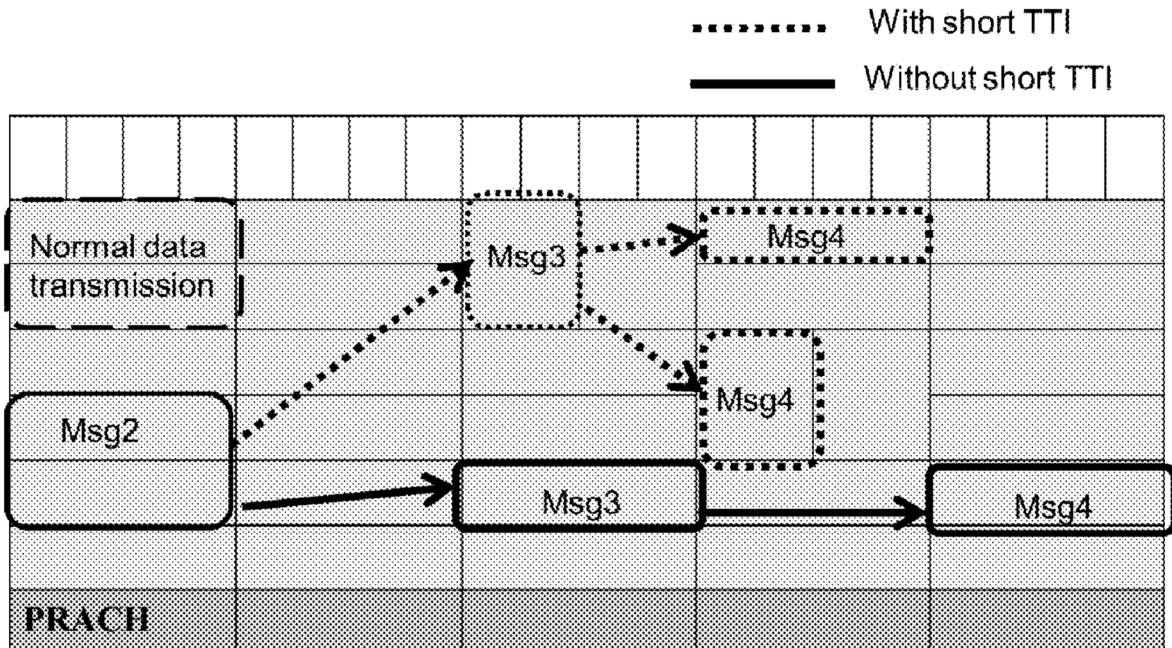


FIG. 7

Id., Fig. 7. As illustrated, short TTI accelerates the random access procedure by shortening Msg3 and the corresponding fixed gap period (both of which are normally 1 frame). In this example, Msg4 is transmitted a full frame earlier with

short TTI than without short TTI. This ultimately allows the UE (User Equipment) to connect to an eNB (base station) more quickly. *See, e.g., id.*, Fig. 11 (showing short TTI applied to Msg2 and Msg3).

1. Challenged Claims

The Petition challenges claims 1, 5, 7, 8, 12 and 14 of the '052 Patent. Pet., 3. Claims 1 and 8 are independent. EX1001 ['052 Patent], cls. 1 and 8. Claims 5 and 7 depend from claim 1 and claims 12 and 14 depend from claim 8. *Id.*, cls. 5, 7, 12 and 14.

Independent claim 1 is listed below.

1. A method of a UE (User Equipment) for performing random access procedure, comprising:
the UE transmits a preamble to a network;
the UE receives a Msg2 containing a TTI (Transmission Timer Interval) information of a Msg3, associated with uplink, from the network in response to the preamble, wherein the TTI information, contained in the Msg2, of the Msg3, associated with uplink, includes a TTI duration of the Msg3, associated with uplink, and a start timing offset of the Msg3, associated with uplink; and
the UE performs a single (TB) transport block of Msg3 transmission to the network according to the TTI information of the Msg3.

Id., cl. 1. Independent claim 8 is similar for purposes of this POPR, claiming an apparatus version of claim 1.

The claims require including TTI information of a message 3 in a message 2, wherein that TTI information includes a TTI duration (i.e., the duration of the TTI interval) and a start timing offset for message 3. Then, the transport block of message 3 is performed according to the TTI information of message 3.

2. Prosecution History

Patent Application No. 16/052,505 was filed on August 1, 2018 claiming priority to Provisional Application No. 62/367,875, filed July 28, 2016, through Application No. 15/663, 674, filed July 28, 2017. On January 29, 2019, an Office Action issued with a restriction requirement requiring applicant to elect a single species from the species disclosed in Figs. 12-19. EX1002 [FH], 87. In response, applicant submitted that the pending claims 1-14 “belong to Specie 3 (shown in Fig. 14 and described in at least Paragraphs [00118]-[00119] of the present application.)” *Id.*, 92.

On March 25, 2019, the examiner issued an office action rejecting pending claims 1-14 over Mujtaba et al. (US Pub. 20160366705 A1) in view of Ai (US Pub. 20100177675 A1). *Id.*, 100. The examiner conceded that “Mujtaba doesn’t explicitly teach the TTI information includes a TTI duration and a start timing offset of a message” but argued that “Ai discloses wherein the TTI information of

the Msg includes a TTI duration of the Msg and a start timing offset of the Msg [0067].” *Id.*, 101.

On June 21, 2019, the applicant traversed the rejection, arguing that “Ai discloses that a network determines a transmitting offset of its transmission and sends to a UE for UE determining reception timing. In contrast, as disclosed in the present application and recited in the claims, a network determines a transmitting offset of a UE’ s transmission and instructs UE to follow the transmitting offset to transmit.” *Id.*, 118. The applicant also pointed out that a POSITA would not combine Mujtaba and Ai because “Ai discloses a method is for a base station to broadcast contents of different MBMS services, while Mujtaba pertains to a random access procedure.” *Id.*

On July 31, 2019, the examiner issued a final rejection rejecting claims 1-14. *Id.*, 126. The examiner maintained the arguments from his previous rejection, arguing that Ai’s TDM Offset was equivalent to the claimed “start timing offset” and that Mujtaba’s “transmission time interval bundling (TTI-B).” *Id.*, 131. The examiner also rejected applicant’s nonobviousness arguments. *Id.*

On October 25, 2019, the applicant submitted a request for continued examination. *Id.*, 145. The applicant amended the claims to clarify that “the UE performs a single transport block (TB) of Msg3 transmission to the network

according to the TTI information of the Msg3.” *Id.*, 150. This amendment distinguished the claims from Mujtaba’s TTI bundling embodiments. *Id.*, 153. Applicant also distinguished Ai because it “is related to multimedia broadcast multicast services (MBMS), which is irrelevant to the random access procedure.” *Id.*

On January 13, 2020, the examiner issued another nonfinal rejection, this time relying on Lohr et al. (US Pub. 20120147830 A1) (EX1005 in this IPR), arguing that “Lohr discloses (Figs. 7-15) perform a single transport block (TB) of Msg transmission to the network according to the TTI information of the Msg”, relying on Lohr [0120], [0183], [0187]. *Id.*, 164.

The examiner appears to have read these passages out of context from the surrounding language. Lohr [0120] states that “The mobile terminal is therefore transmitting different redundancy versions of the same transport block within a number of consecutive transmission time intervals.” Thus, Lohr [0120] is not sending a single transport block, it is sending multiple redundant transport blocks (e.g., TTI bundling). Lohr [0183] is discussing how the mobile terminal determines a “transport block size”, not that Lohr is sending a single transport block. Lohr [0187] is determining whether TTI bundling is necessary, not stating that Lohr is

performing a single transport block of Msg3 transmission to the network according to the TTI duration and start timing offset as required by the claim.

The applicant responded on April 13, 2020 by pointing out that Ai is “silent as to a UE receiving a Msg2 (e.g., associated with downlink) containing a TTI information of a Msg3 (e.g., associated with uplink) from a network in response to the preamble, wherein the TTI information of the Msg3 includes a TTI duration of the Msg3 and a start timing offset of the Msg3.” *Id.*, 200. The applicant also pointed out that Lohr does not disclose “a UE performing a single (TB) transport block of Msg3 transmission to a network according to TTI information of a Msg3.” *Id.*, 201. Instead, the applicant correctly pointed out that Lohr discloses “a TTI bundling mode via which multiple redundant versions of a transport block [i.e., multiple transport blocks] are transmitted.” *Id.*

On May 1, 2020, the examiner issued a final rejection maintaining its previous rejections. *Id.*, 212. In support, the examiner relied on the same paragraphs from Lohr, in addition to Lohr [0164]. *Id.*, 214. Lohr [0164] has the same error as the other paragraphs cited by the examiner—it is discussing a single transport block that is repeatedly transmitted via TTI bundling. EX1005 [Lohr], [0164] (“A single transport block from MAC layer for the first scheduled transmission of the random access procedure is coded and is transmitted repeatedly

in four consecutive subframes, i.e. also referred to as TTI bundle...”). Thus, Lohr’s UE is not performing “a single (TB) transport block of Msg3 transmission” as required by the claims, it is performing four transport blocks of Msg3 transmission.

On July 9, 2020, the applicant held an interview with the examiner. *Id.*, 243.

The examiner summarized the interview as follows:

Applicant persuasively discussed the background of the invention and the perceived novelty of the current claimed invention. Applicant furthermore descriptively explained how the current claimed invention differs from the cited prior art(s). Applicant proposed to clarified the structure elements of the uplink and downlink messages, and amend the claims to show the functional language of the said element. Upon receiving an official response, an updated search and/or consideration must be required.

Id. Thus, the applicant convinced the examiner that Mujtaba, Ai and Lohr did not teach or suggest the independent claims by “descriptively explain[ing] how the current claimed invention differs from the cited prior art.”

The applicant further amended the claims to clarify that Msg2 is associated with the downlink and Msg3 is associated with the uplink. *Id.*, 254-255. These amendments were unrelated to the “single transport block” limitation. *Id.* After additional amendments and an additional interview to address the examiner’s apparent mistaken belief that the specification does not provide support for Msg2

as associated with the downlink or Msg3 associated with the uplink, the examiner issued a notice of allowance. *Id.*, 449-450, 483-484, 491-492, 512, 515-521, 528.

(a) '985 Application

The Petition discusses the prosecution of patent application 17/673,985, the child of the '052 Patent. Pet., 14. Prosecution of the '985 Application was abandoned before the patent applicant responded to the July 26, 2023 non-final rejection or amended the claims. *Id.*; EX1010 ['985 Application FH].

(b) European Patent Application EP17183827.9

The Petition discusses the prosecution history of EP17183827.9, a foreign application based on the same provisional as the '052 Patent. Pet., 15-18; EX1008 [EP FH]. Most of the file history is not pertinent to the '052 Patent. However, Petitioner discusses the EP's conflation of the "timing adjustment" discussed in 3GPP R2-070212 with the "start timing offset" of EP17183827.9.

In its January 7, 2020 communication, the examiner argued that 3GPP R2-070212's "timing adjustment" is equivalent the claimed "start timing offset" in the then-pending claims of EP17183827.9. EX1008 [EP FH], 167; EX2003 [R2-070212], 2.

The applicant responded on May 13, 2020, pointing out that the "timing adjustment" of R2-070212 (labeled D7 in the EP File History) was different than

the claimed “start timing offset.” EX1008 [EP FH], 172. The applicant explained that “the ‘start timing offset’ of the invention is used for the UE to know at which time unit (e.g. slot, symbol, etc.) the Msg3 should be started to send, whereas the ‘timing adjustment’ mentioned in section 2.2 of D7 is used for the UE to know how much small/tiny adjustment at a specific known time unit should be done for sending the Msg3.” *Id.*

The applicant was correct. The “timing adjustment” of R2-070212 “prevent[s] un-synchronized transmission over UL-SCH.” EX2003 [R2-070212], 2. That is, the timing adjustment (or “timing advance”) synchronizes the uplink between the UE and eNB to account for the transmission time between the UE and eNB, which can vary slightly depending on the movement of the UE, among other factors. EX2004 [UMTS Long Term Evolution], 409-410. That is why the applicant characterized it as a “small/tiny adjustment at a specific known time unit.” EX1008 [EP FH], 172.

The start timing offset on the other hand, changes the fixed gap period between Msg2 and Msg3 in order to shorten the time between Msg2 and Msg3 to short TTI. EX1001 [’052 Patent], 13:60-14:3. In other words, the start timing offset sets the gap period between Msg2 and Msg3 transmission to account for required processing time (*Id.*), while the timing adjustment of R2-070212 provides

minor adjustments to the start timing offset in order to account for changes in propagation delay.

In response to the examiner's arguments, the applicant amended the limitation several times to reflect its position, replacing "start timing offset" with "gap period" and amending the claims to state "the TTI information of the Msg3 includes a first number of time units and a second number of time units for indicating a TTI duration of the Msg3 and a gap period between Msg2 reception and Msg3 transmission, respectively." EX1008 [EP FH], 223. These amendments are consistent with the '052 Patent's discussion of "start timing offset." EX1001 [’052 Patent], 13:60-14:11. In response, on March 3, 2022, the EP granted the European Patent without further comment. EX1008 [EP FH], 340.

B. Alleged Prior Art

1. Tang (EX1004)

Tang (US Pat. Appl. Pub. No. 2018/0343682) was published on November 29, 2018, filed on August 2, 2018, and with a potential earliest effective filing date of February 2, 2016, based on the filing of Appl. No. PCT/CN2016/073234. EX1004 [Tang]. Because the '052 Patent was filed on August 1, 2018 and Tang was filed on August 2, 2018, Tang can only be prior art under (AIA) 35 U.S.C.

§102(a)(2) if its parent application, the '234 PCT, provides support. For purposes of this preliminary response, PO takes no position on Tang's eligibility as prior art.

Tang discloses a system and method for configuring short TTI in LTE systems. EX1004 [Tang], Abstract, [0003]. Tang explains that "it is inevitable to confront a problem of how to configure the short TTI, that is, how an evolved node base station (eNB) instructs user equipment (UE) to use a short TTI resource and how the UE uses the short TTI resource." *Id.*, [0005]. According to Tang, "[c]urrently, in the prior art, there is no method for configuring the short TTI." *Id.*

Fig. 3 (below) discloses a method whereby the eNB broadcasts a TTI length supported by the eNB at step S301. *Id.*, [0245]. At step S303, the UE sends a random access preamble to the eNB using the corresponding TTI length. *Id.*, [0248]. The random access preamble "indicates a TTI length that the UE requests to use." *Id.* The eNB sends a random access response message (RAR) to the UE at step S306. *Id.*, [0255]. "the random access response message includes TTI indication information, and the TTI indication information includes at least one of the following information: a TTI length assigned by the eNB to the UE, effective moment information, start symbol location information, and enabling confirm information of the TTI length." At step S308, "the UE begins to communicate with

the eNB at an effective moment and/or a start symbol location by using the TTI length assigned by the eNB to the UE.” *Id.*, [0271].

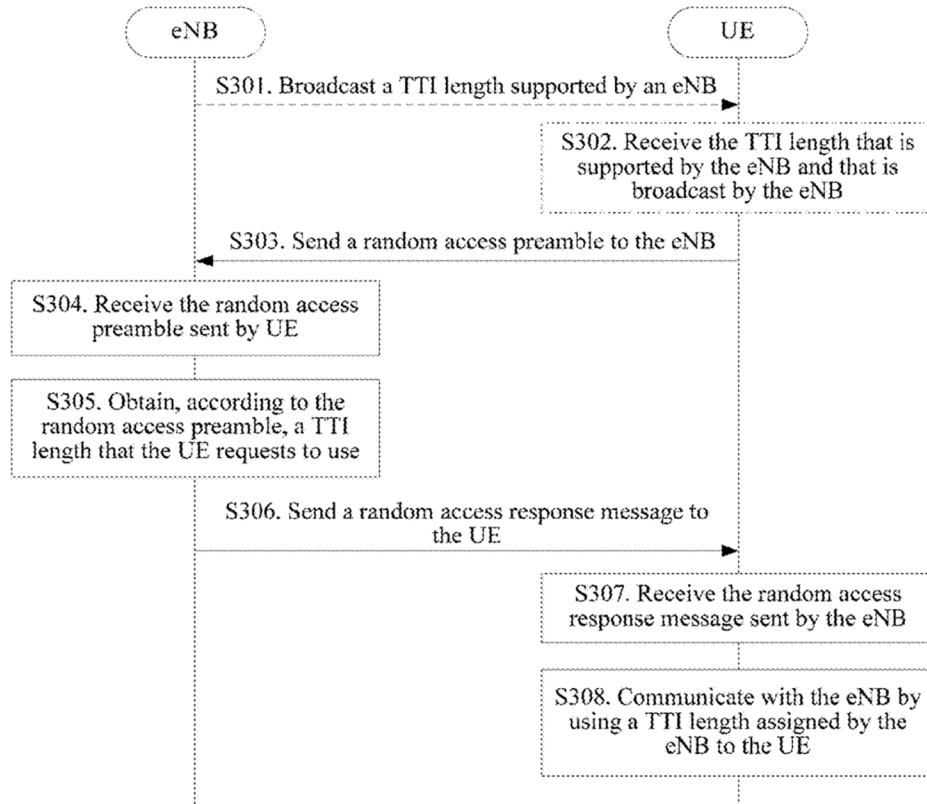


FIG. 3

2. Lohr (EX1005)

Lohr (Patent Application Publication No. US2012/0147830) is directed to the random access procedure in mobile communications systems for use in 3GPP LTE Release 8. EX1005 [Lohr], Abstract, [0004]. During prosecution, the examiner relied on and discussed Lohr as part of two rejections involving the “single (TB) transport block” limitation of claims 1 and 8, but was convinced by

the applicant that Lohr does not disclose this limitation and withdrew the rejection over Lohr. EX1002 [FH];], 164, 214, 242-243.

Lohr does not disclose short TTI. Instead, Lohr discloses the concept of “TTI bundling.” *Id.*, [0112]. In TTI bundling mode, “the mobile terminal may for example send multiple redundancy versions of the same transport block within a number of consecutive transmission time intervals on the granted resource.” *Id.*

Lohr explains the concept as follows:

As a “bundle” of transmission is sent in consecutive transmission time intervals (TTIs), the combining gain achieved by combining the individual transmissions of the (redundancy versions of the) transport block in the decoding process allows to significantly increase the probability of successful decoding while further reducing the retransmission delay when utilizing HARQ for the scheduled transmission.

Id., [0112]. Thus, Lohr’s “TTI bundling mode” sends redundant transport blocks on consecutive TTIs to increase the gain and thereby increase the likelihood the eNB can successfully decode the message. *Id.* The UE uses TTI bundling mode based on a transmission mode indicator received from the eNB. *Id.*, [0176], [0178], Fig. 10. If the transmission mode indicator does not indicate TTI bundling, Lohr simply sends a conventional transmission in a single TTI. *Id.*, [0175].

3. Tirronen (EX1006)

Tirronen (U.S. Pat. No. 10,743,350) issued on August 11, 2020 and was filed on December 6, 2016. EX1006 [Tirronen]. Tirronen claims priority to PCT/SE2016/050841, filed on September 8, 2016, and Provisional application No. 62/232,743, filed on September 25, 2015. Because the '052 Patent has an earliest effective filing date of July 28, 2016 (based on the '875 Provisional), Tirronen can only be prior art under (AIA) 35 U.S.C. §102(a)(2) if the '743 Provisional, filed on September 25, 2015, provides support. For purposes of this preliminary response, PO takes no position on Tang's eligibility as prior art.

Tirronen is directed to random access procedure for “machine-type communication (MTC) wireless terminals” such as “wirelessly networked sensors, meters, etc.” EX1006 [Tirronen], 1:35-55. Tirronen recognizes that such sensors or meters “may be located in areas (e.g., basements) with unfavorable radio conditions” and therefore “may have difficulty transmitting and/or receiving communications of a conventional random access procedure.” *Id.*, 1:42-46. Tirronen distinguishes between such MTC wireless terminals and “conventional mobile wireless terminal UEs” that operate using Legacy LTE random access procedure. *Id.*, 9:22-36. Thus, Tirronen is solving a specific problem associated with MTC wireless terminals.

Tirronen's proposed solution starts with the known 3GPP LTE contention based random access procedure (*Id.*, 8:59-9:5, Fig. 4) and the known 3GPP LTE Random Access Response (RAR) message used in 3GPP LTE MAC protocol specification release 12. *Id.*, 3:44-49. Tirronen discloses that the UL grant in the RAR may include a "transmission time interval (TTI) field for message 3 transmission on the uplink." *Id.*, 13:31-35. The UL grant for MTC wireless terminal UEs may also include a "repetition information for uplink message 3...." *Id.*, 9:31-36. "Such repetition may not be needed, however, for non-MTC wireless terminals (e.g., for conventional wireless terminals such as cellular radiotelephones, smartphones, tablet computers, laptop computers, etc.)." *Id.*, 10:35-39; *see also id.*, 9:22-36 (contrasting MTC wireless terminals, which include repetition information, with conventional mobile wireless terminals such as cell phones that operate "without including repetition information.").

Tirronen does not involve short TTI like the '052 Patent. Instead, Tirronen involves "extended TTI" that are similar to the TTI bundling in Mujtaba and Lohr that applicant distinguished over during prosecution. That is, a TTI in Tirronen is composed of "Q subframes." EX1006 [Tirronen], 13:31-35. A "legacy LTE" TTI is "one subframe, i.e., 1 millisecond." *Id.*, 11:22-25. "A typical value in an extended TTI may be composed of six subframes." *Id.*, 11:28-29. Tirronen also

discloses that the TTI may be repeated over “R repetitions,” resulting in transmissions that take place over “Q*R subframes.” *Id.*, 13:31-35.

The purpose of Tirronen’s extended TTI also differs from the ’052 Patent’s short TTI. In the ’052 Patent, the TTI duration is set shorter than a single subframe in order to “accelerate [the] random access procedure” and “achieve dynamic TTI change in random access” in LTE. EX1001 [’052 Patent], 8:49-52. That is, the ’052 Patent is trying to speed up LTE’s random access procedure by shortening the TTI. *See id.*, 9:9-18, 13:60-14:3, Figs. 7, 11.

Instead of shortening TTI, Tirronen is directed to extending the TTI over multiple subframes for “MTC wireless terminals” that “transmit relatively small amounts of uplink (UL) data relatively infrequently” (EX1006 [Tirronen], 1:37-41) and are often “located in areas (e.g., basements) with unfavorable radio conditions” where there is “difficulty transmitting and/or receiving communications of a conventional random access procedure.” *Id.*, 1:42-46. This is a similar concept to the TTI bundling described in Lohr, and used for similar reasons such as increasing gain and the probability of successfully decoding MTC transmissions. *Supra*, §II.C.2. That is, using extended TTI results in more reliable transmissions with difficulty to reach MTC wireless terminals at the expense of speed.

III. CLAIM CONSTRUCTION

Petitioner “does not believe any claim constructions are required and interprets the claims at issue in accordance with their ordinary and customary meanings.” Pet., 22. For purposes of this preliminary response, Patent Owner’s position is that all terms are entitled to their plain and ordinary meaning as understood by a POSITA. PO reserves the right to provide express constructions for claim terms in the ’052 Patent if this IPR is instituted.

IV. PETITIONER HAS NOT SHOWN A REASONABLE LIKELIHOOD OF SUCCESS FOR GROUND 1

A. Tang Does Not Disclose Or Suggest “The UE Performs A Single (TB) Transport Block of Msg3 Transmission To The Network According To The TTI Information of the Msg3”

Tang does not disclose this limitation because Tang does not discuss transport blocks or provide any details regarding Msg3 transmission. Petitioner argues that “Tang discloses and suggests this limitation to a POSITA because Tang is silent on whether TTI bundling should be used and TTI bundling is not normally used in conventional, contention-based, random access Msg3 transmissions.” Pet., 53. Conventional, contention-based, random access Msg3 transmissions do not have variable length transmission time intervals. EX1004 [Tang], [0003] (“In a conventional Long Term Evolution (LTE) communication protocol, a transmission time interval (TTI) is a basic time unit in time domain of LTE radio resources, and

has a standard time length that is 1 ms.”); EX2004 [UMTS Long Term Evolution], 190 (“a TTI is 1 ms, corresponding to the subframe duration.”), 323 (“The 1 ms subframe allows a 1 ms scheduling interval (or Transmission Time Interval (TTI)), as for the downlink, to enable low latency.”). Thus, the conventional TTI is a standard 1ms.

Similarly, conventional, contention-based, random access Msg 3 transmissions have a fixed start timing offset. As the '052 Patent explains, LTE has a “fixed gap period” between Msg2 reception and Msg3 transmission:

Msg3 start timing offset—In LTE, there is a fixed gap period between Msg2 reception and Msg3 transmission. The fixed gap period is designed for covering UE’s Msg2/3 processing time (e.g., decode, (de-) multiplexing transport block).

EX1001 [’052 Patent], 13:60-64. *See id.*, 14:1-3 (“Otherwise, the minimum gap could only be set to normal sub-frame length like without short TTI case.”) Since the “conventional” TTI in LTE is a fixed standard length and conventional LTE has a “fixed gap period” between Msg2 and Msg3, there is no need to include a TTI duration or start timing offset in the TTI information in conventional LTE. The values do not change.

The claim requires the “UE performs a single (TB) transport block of Msg3 transmission to the network according to the TTI information of the Msg3.”

EX1001 ['052 Patent], cls. 1, 8. “[T]he TTI information” refers by antecedent basis to the TTI information in the previous limitation that “includes a TTI duration ... and a start timing offset.” But in “conventional, contention-based, random access Msg3 transmissions,” (Pet., 53), there is no need for TTI duration or a start timing offset because the TTI duration and start timing offset in conventional LTE are “standard” or “fixed” values. That is, every TTI is the same interval starting at the same time. Adding fields for these values in the RAR message (Msg2) would be pointless.

Tang is not directed to “conventional, contention-based, random access Msg3 transmissions.” Pet., 53. Instead, Tang is directed to disclosing a method for configuring short TTI. EX1004 [Abstract] (“This disclosure relates to a TTI configuration method, a device, and a system, so as to resolve a problem that there is no method for configuring a short TTI.”); [0005] (“Currently, in the prior art, there is no method for configuring the short TTI.”). *Id.*, [0005]. *See id.*, [0006], [0012], [0026], [0035], [0041], [0047], [0055], [0063], [0067], [0072], [0084], [0093], [0097], [0101], [0107], [0113], [0117] (all same).

Tang’s method—unknown in the prior art at the time according to Tang—is not conventional, contention-based, random access Msg3 transmission. With respect to Msg3, Tang only discloses that the UE “communicates with the eNB by

using a TTI length assigned by the eNB to the UE.” EX1004 [Tang], [0271], Fig.

3. Tang does not disclose that Tang’s Msg3 is a single transport block or that it is transmitted “according to” a start timing offset in the TTI information. Petitioner’s hypothesis that a POSITA would assume Tang’s Msg3 transmission uses a single transport block or a start timing offset is hindsight.

Petitioner raises TTI bundling because Tang does not disclose the limitation. Pet., 53 (“this limitation appears to be directed to a UE transmitting a Msg3 transmission without TTI bundling.”). Petitioner’s TTI bundling argument is a strawman. The ’052 Patent does not discuss TTI bundling. The challenged limitation is directed to the ’052 Patent’s innovative solution that uses “short TTI” to reduce the “random access latency” in LTE’s contention based random access procedure. *See, e.g.*, EX1001 [’052 Patent], 8:49-57, 9:9-18, Figs. 7, 11. Nor does Tang have anything to do with TTI bundling. Pet., 53 (“Tang is silent on whether TTI bundling should be used...”). Instead, Tang is directed to a method for configuring short TTI. *Supra*, §II.C.1.

Neither the ’052 Patent nor Tang discuss TTI bundling. Both relate to the different concept of short TTI. *Supra*, §§II.B, II.C.1. A POSITA considering Tang would have no reason to consider TTI bundling or whether “TTI bundling is []

normally used in conventional, contention-based, random access Msg3 transmissions.” Pet., 53. Thus, Petitioner’s argument is hindsight.

Accordingly, Tang does not disclose or suggest this limitation.

B. Lohr Does Not Disclose Or Suggest “The UE Performs A Single (TB) Transport Block of Msg3 Transmission To The Network According To The TTI Information of the Msg3”

Petitioner combines Tang with Lohr for this limitation. Pet., 54-57. Lohr does not disclose this limitation because it is directed to TTI bundling over multiple transport blocks and does not perform a single TB of Msg3 transmission according to the TTI Information of the Msg3. In Lohr’s “TTI bundling mode, the mobile terminal may for example send multiple redundancy versions of the same transport block with a number of consecutive transmission time intervals (TTIs)....” EX1005 [Lohr], [0175]. Lohr’s TTI bundling repeatedly resends the same transmission block to the eNB across consecutive TTIs for purposes of increasing the gain and increasing the probability of successful decoding. *Id.* Thus, Lohr’s TTI bundling mode does not send a single transport block.

Petitioner argues that Lohr meets this limitation when it does not use TTI bundling. Pet., 55-57. That is, Lohr’s RAR contains a bit (or flag) that, when set to one, indicates TTI bundling mode is used and when set to zero indicates TTI bundling mode is not used. EX1005 [Lohr], [0175], Pet., 55.

Petitioner is incorrect because when TTI bundling is not used, Lohr is using a “backward compatible” “non-bundling mode.” EX1005 [Lohr], [0169]. That is, the bit “used for signaling the transmission mode (TM)” when set to zero “ensures backward compatibility with 3GPP LTE (Rel. 8) compatible user equipments.” *Id.*, [0171]. This is because “3GPP LTE (Rel. 8) compatible user equipments [] ignore the first bit of the random access response message.”

In other words, Lohr’s backward compatible “non-bundling mode” is describing the conventional LTE random access procedure shown in Lohr Fig. 5. *Id.*, [0136] (“FIG. 5 shows the signaling messages of a contention based random access procedure in a 3GPP LTE (Rel. 8) system”); Fig. 5. In this conventional mode, TTI duration and start timing offset are fixed, constant values. *See supra*, §IV.A (describing standard 1ms TTI duration and fixed gap period in conventional LTE).

As discussed above for Tang, the “TTI information” for conventional LTE RAR does not include TTI duration or start timing offset. *Supra*, §IV.A. The same is true in Lohr. *See also* EX1005 [Lohr], [0170], Fig. 7 (discussing and showing the format of the MAC Random Access Response of 3GPP LTE (Rel. 8), without any mention of TTI duration or start timing offset). Thus, when Lohr’s transmission mode is set to backward compatible non-bundling mode, it does not

perform a single TB of Msg3 transmission according to the TTI Information of the Msg3 because “the TTI information” does not include a TTI duration or start timing offset.

Petitioner incorrectly relies on the prosecution history in an attempt to support its position. Petitioner points out that the examiner initially argued Lohr discloses this limitation but Petitioner then incorrectly argues “the examiner maintained this same position regarding Lohr throughout prosecution.” Pet., 54. First, as discussed above, the examiner’s rejections using Lohr were based on an manifest misreading of Lohr. *Supra*, §II.B.2. That is, the passages cited by the examiner disclose transmitting redundant transport blocks across a number of consecutive transmission time intervals as part of TTI bundling. *Id.* While each transport block may be identical, there are multiple (e.g., 4) identical transport blocks transmitted. *See* EX1005 [Lohr], [0120], [0164]. [0183], [0187]. The TTI-bundled transmission is not a single transport block.

Second, the examiner changed their position regarding Lohr and conceded Lohr does not teach the limitation. On July 14, 2020, the examiner issued an Applicant-Initiated Interview Summary. EX1002 [FH], 242-243. In the summary, the examiner discussed the pending rejection over Mujtaba in view of Ai in further view of Lohr. *Id.*, 243. The examiner was convinced of the novelty of the claims,

stating “Applicant persuasively discussed the background of the invention and the perceived novelty of the current claimed invention.” *Id.* The examiner was also convinced that the claims were distinguishable over Lohr and the other prior art, stating “Applicant furthermore descriptively explained how the current claimed invention differs from the cited prior art(s).” *Id.*

While the applicant during the interview proposed minor amendments to “clarify the structure elements of the uplink and downlink messages” (*id.*), these clarifications did not impact the “single (TB) transport block” limitation. *Id.*; *see also id.*, 254-255. And while the examiner issued two further rejections, they were limited to §112 rejections involving the new uplink and downlink limitations and had nothing to do with the “single (TB) transport block” limitation or Lohr. *Id.*, 447-451, 489-494. Thus, the examiner ultimately agreed with the applicant and PO that Lohr does not disclose “the UE performs a single (TB) transport block of Msg3 transmission to the network according to the TTI information of the Msg3.”

Accordingly, Lohr does not disclose this limitation.

V. PETITIONER HAS NOT SHOWN A REASONABLE LIKELIHOOD OF SUCCESS FOR GROUND 2

A. Tirronen Does Not Teach Or Suggest “The UE Performs A Single (TB) Transport Block of Msg3 Transmission To The Network According To The TTI Information of the Msg3”

Tirronen does not disclose this limitation because Tirronen’s TTI field extends TTI over multiple subframes rather than shortening it within an existing subframe. *Supra*, §II.C.3. Tirronen only uses a single subframe for legacy LTE transmissions where the TTI duration and start timing offset are fixed.

Petitioner argues that “when the TTI field is set to 0, Tirronen’s UE transmits a single Msg3 transport block to the network according to the TTI information provided in Msg2.” Pet., 74-75. The TTI field in Tirronen is a bit (or number of bits) in the UL grant of Msg2 used to convey the length of the TTI transmitted in Msg3. EX1006 [Tirronen], 11:20-34. When the TTI field in Tirronen is set to 0, that indicates the UE is a “legacy LTE system” with a standard TTI length of 1ms. EX1006 [Tirronen], 11:24-27 (“In one alternative (as in legacy LTE system), a TTI is one subframe, i.e., 1 millisecond. ... TTI field=0 indicates TTI of one subframes.”). Thus, when the TTI field is set to 0, Tirronen, like Tang, transmits conventional, contention-based, random access Msg3 transmissions. These “legacy” transmissions lack the concept of short TTI and do not need to specify TTI durations or start timing offsets because these values are known, fixed

values. Thus, Tirronen does not transmit Msg3 “according to the TTI information of Msg3”

Petitioner’s argument equates Tirronen’s “TTI field” with the claimed “TTI information.” Pet., 74-75. The two are different concepts. Tirronen’s TTI field indicates different TTI lengths for different categories of devices (e.g., “legacy LTE systems” versus “narrowband IOT systems.”) EX1006 [Tirronen], 11:24-29. That is, “conventional” UEs like cellphones operate using legacy LTE with a fixed TTI of 1 ms. *Id.*; *see also supra*, §II.C.3. However, for other types of UEs (like narrowband IOT systems or machine-type communication (MTC) wireless terminals), Tirronen suggests modifying the conventional random access procedure. EX1006 [Tirronen], 1:35-46; *supra*, §II.C.3.

“TTI information” in claims 1 and 8 of the ’052 Patent is different. By antecedent basis, the claimed TTI information must include both “a TTI duration of the Msg3” and “a start timing offset of the Msg3.” Neither of these is disclosed as present in Tirronen’s TTI field because the values are fixed during “Legacy LTE” operation. *Supra*, §IV.A. Accordingly, Tirronen does not disclose this limitation.

VI. CONCLUSION

Based on the foregoing, the Board should deny institution because there is no

reasonable likelihood that the petitioner would prevail with respect to any challenged claim.

Dated: October 30, 2024

Respectfully submitted,

/ Stephen McBride /

Stephen McBride (Reg. No. 78,396)

CARMICHAEL IP, PLLC

8607 Westwood Center Drive

Suite 270

Tysons, VA 22182

Tel: (703) 646-9247

stevemcbride@carmichaelip.com

Counsel for Patent Owner

CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME LIMITS

This Patent Owner Preliminary Response consists of 5,950 words, excluding table of contents, table of authorities, certificate of service, this certificate, or table of exhibits. The Response complies with the type-volume limitation of 14,000 words as set forth in 37 C.F.R. § 42.24. In preparing this certificate, counsel has relied on the word count of the word-processing system used to prepare the paper (Microsoft Word).

Dated: October 30, 2024

/ Stephen McBride /
Stephen McBride (Reg. No. 78,396)
CARMICHAEL IP, PLLC
8607 Westwood Center Drive
Suite 270
Tysons, VA 22182
Tel: (703) 646-9247
stevemcbride@carmichaelip.com

Counsel for Patent Owner

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6, the undersigned certifies that on October 30, 2024, a copy of the foregoing documents **PATENT OWNER PRELIMINARY RESPONSE AND EXHIBITS** were served by electronic mail, as consented to by Petitioner, upon the following:

Greenberg Traug, LLP

Heath J. Briggs (Reg. No. 54,919)

BriggsH@gtlaw.com

Trenton Ward (Reg. No. 59,157)

Trenton.Ward@gtlaw.com

Andrew Sommer (Reg. Mo. 53,932)

SommerA@gtlaw.com

Vimal M. Kapadia (Reg. No. 73,310)

KapadiaV@gtlaw.com

Stephen M. Ullmer

UllmerS@gtlaw.com

Jared K. Lee (Reg. No. 72,786)

Jared.lee@gtlaw.com

Samsung-ASUS-IPRs@gtlaw.com

By: /s/Stephen McBride