

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

TOGAIL TECHNOLOGIES LTD.,
Patent Owner.

IPR2023-00645
U.S. Patent No. 10,743,238

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

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Ex.1007	3GPP TSG RAN WG2 Meeting #99bis R2-1711767, “Discussion on the granularity of SI change notification,” Source: ITRI
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Ex.1021	3GPP TSG RAN WG1 Meeting #90 R1-1713654, “Wider Bandwidth Operations,” Source: Samsung
Ex.1022	WDTX case 622-cv-00326, Plaintiff’s Infringement Contentions, Exhibit A (’238), served Oct. 3, 2022
Ex.1023	PCT Publication No. WO 2019/068224 to Dawid <i>et al.</i>
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Ex.1028	WDTX case 622-cv-00326, Dkt. 33, Scheduling Order, filed Oct. 24, 2022
Ex.1029	WDTX case 622-cv-00326, Dkt. 53, Defendant’s Reply re Motion to Transfer Venue, filed Feb. 9, 2023
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Ex.1031	WDTX case 622-cv-00326, Dkt. 49, Apple’s Opening Markman Brief, filed Jan. 26, 2023
Ex.1032	WDTX case 622-cv-00326, Dkt. 54, Togail’s Responsive Markman Brief, filed Feb. 16, 2023
Ex.1033	WDTX case 622-cv-00326, Dkt. 55, Apple’s Reply Markman

	Brief, filed Mar. 2, 2023
Ex.1101	Excerpts from F. Hillebrand, GSM and UMTS: The Creation of Global Mobile Communication, Wiley 2002
Ex.1102	Excerpts from H. Myung et al., Single Carrier FDMA: A New Air Interface for Long Term Evolution, Wiley 2008
Ex.1103	Excerpts from H. Holma et al., WCDMA for UMTS: Radio Access for Third Generation Mobile Communications, Revised Edition, Wiley 2001
Ex.1104	Email dated Dec. 1998 from 3GPP TSG RAN WG2 Archives, available at https://list.etsi.org/scripts/wa.exe?A2=ind9812&L=3GPP_TSG_RAN_WG2&O=D&P=65
Ex.1105	Wayback Machine capture of 3GPP-IETF Standardization Collaboration, RFC 3113 (as of Nov. 24, 2001), available at https://web.archive.org/web/20011124104400/http://www.ietf.org/rfc/rfc3113.txt (combined PDF of seven individual screenshots due to formatting)
Ex.1106	Third Generation Partnership Project, 3GPP Working Procedures (July 17, 2000)
Ex.1107	F. Harrison & K.A. Holley, The development of mobile is critically dependent on standards, 19 BT Tech. J. 32 (Jan. 2001)
Ex.1108	RAN1 - Radio layer 1 June 2017, web archive of https://www.3gpp.org/specifications-groups/ran-plenary/ran1-radio-layer-1
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Ex.1110	RAN WG1 NR AH 17 06 meeting participants list
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Ex.1129	R2-17xxxxx-RAN2-99bis-Prague-Proposed-Agenda-v1.0
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Ex.1132	RAN2 #99bis tdocList (excerpted to include left-most columns)

Ex.1133	R1-179972 word doc properties
Ex.1134	3GPP WP - October 2016
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Ex.1137	TDoc List Meeting RAN1-NR#2 (excerpted to include left-most columns)
Ex.1138	LISTSERV Archives at LIST.ETSI.ORG - Jan 2021
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Ex.1142	TSG RAN WG2 RL2 TSGR2 99bis Docs, ftp website
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I. INTRODUCTION

U.S. Patent No. 10,743,238 (the “’238 patent,” Ex.1001) is directed to performing a “bandwidth part (BWP) switching operation ... to receive the changed contents of system information.” Ex.1001, Abstract. The alleged invention is merely “*switching from the currently active BWP to an initial active BWP for an SI update,*” which is done “*in response to receiving the SI [system information] change indication.*” Ex.1001, 12:49-51. However, the ’238 patent itself admits it was known in the art that, upon receiving a “system information change [notification], the Connected_UE may have to switch from the currently active BWP to the initial active BWP for accessing the [SI update].” Ex.1001, 1:36-39. Indeed, the prior art references discussed below confirm this was already known. *See, e.g.*, Ex.1008, 7:41-53, 8:50-53; Ex.1010, ¶¶0290, 0297, 0299; Ex.1013, ¶¶0113, 0284.

Accordingly, pursuant to 35 U.S.C. §§ 311, 314(a), and 37 C.F.R. § 42.100, Apple Inc. (“Petitioner”) respectfully requests that the Board review and cancel as unpatentable under 35 U.S.C. §103 claims 1-5 and 11-15 (hereinafter, the “Challenged Claims”) of the ’238 patent.

II. GROUNDS FOR STANDING

Petitioner certifies that the ’238 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. **Emphasis** in quoted material has been added. Claim terms are presented in *italics*.

IV. TECHNOLOGY BACKGROUND

The declaration of Dr. Zhi Ding provides the following discussion of SI updates and BWPs related to the '238 patent. Ex.1003, ¶¶29-47.

A. Remaining Minimum System Information (RMSI)

It was commonly known that when a cellular phone user first turns on the device, called user equipment (UE), the UE needs to know certain parameters or information about the cellular network—called system information (SI)—to function properly. In a 5G network (as well as 3G and 4G), after powering on, the UE may acquire the first piece of SI: the master information block (MIB). The MIB is repeatedly broadcast by all network base stations so that it is easily accessible to UEs that initially had little or no other information about the system. *See* Ex.1007, 1; Ex.1013, [0091]; Ex.1014, 55-56.

The MIB includes information on where the UE can acquire additional pieces of SI that the UE needs. One such information is called SI block 1 (SIB1). The MIB includes the time and frequency scheduling information of a “search space” for the UE to monitor for SIB1. The UE scans this search space to find and

receive a broadcast of SIB1. *See* Ex.1007, 1; Ex.1003, ¶¶30-31.

The UE needs both MIB and SIB1 before it can enter a connected mode to, for example, make calls and exchange other data. Together, these pieces of SI—MIB and SIB1—are referred to as “required SI” or “minimum SI.” Ex.1007, 1; Ex.1015, 1. Once the UE has MIB, the UE still needs the “remaining minimum system information” (RMSI) to enter connected mode; the UE still needs SIB1. The terms SIB1 and RMSI are sometimes used interchangeably. Ex.1003, ¶32.

Because the RMSI (SIB1) needs to be readily available, so that all UEs in the network can enter and maintain connected mode, the frequency band scheduling location of RMSI is included in MIB, which is repeatedly broadcasted. Ex.1012, 2. The RMSI, in turn, includes scheduling information for other SI blocks (SIBs, called SIB2, SIB3, *etc.*) used during connected mode; and while the UE needs at least MIB and RMSI (SIB1) to enter connected mode, the UE may or may not need some of these other SIBs. *See* Ex.1007, 1-3; Ex.1015, 2; Ex.1003, ¶33.

It was commonly known that these SIBs and the RMSI itself may be updated over time; for instance, the value tags of other SIBs listed in SIB1 may change, indicating the SIB(s) has updated. Ex.1007, 1. The UE then needs to reacquire the updated RMSI to maintain connected mode. Ex.1007, 2. The UE may locate RMSI based on the frequency band scheduling information provided in MIB, which is the same way the UE locates RMSI after powering on. Ex.1007, 1-2; Ex.1003, ¶35.

When there is an SI update, the 5G network may broadcast a notification, via paging message, to all UEs. Ex.1007, 1-2; Ex.1027, 4:1-11; Ex.1008, 7:48-51; Ex.1024, ¶0284. If the UE receives the SI update notification, the UE may reacquire RMSI/SIB1 from the frequency location indicated in the MIB to maintain connected mode. Ex.1001, 1:35-41; Ex.1007, 2; Ex.1003, ¶36.

B. Frequency Bandwidth Parts (BWPs)

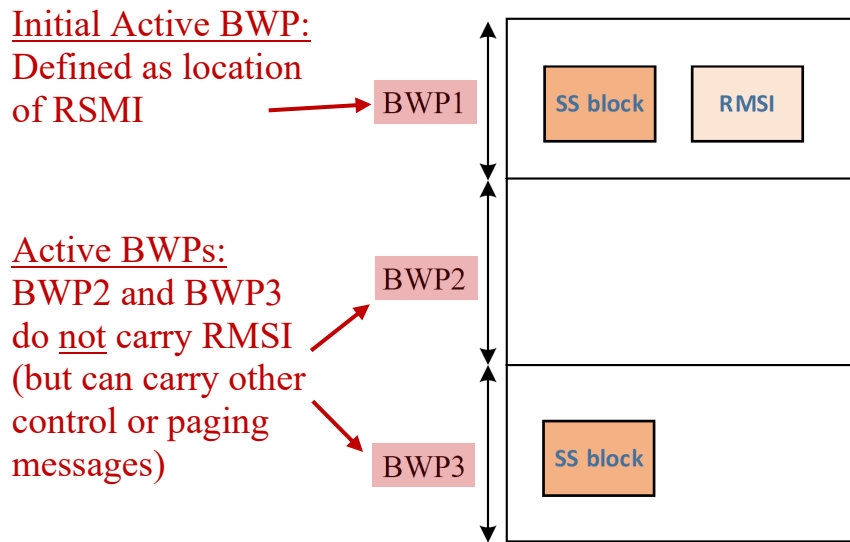
It was commonly known that 5G could include a frequency partitioning concept called “bandwidth parts” (BWPs) where a UE’s frequency bandwidth can be divided into frequency sub-bands or parts called BWPs. Ex.1010, ¶¶0276, 0290; Ex.1012, 2. One or more downlink BWP(s) and uplink BWP(s) can be configured for a UE. Ex.1010, ¶0277. The ’238 patent and following discussion refer to *downlink* BWPs. Ex.1003, ¶¶37-39.

Two main kinds of downlink BWPs were commonly known. First, the “initial active BWP” is defined as the location of RMSI. Ex.1014, 68. A UE that powers on may read the broadcasted MIB, which tells the UE the frequency location of the RMSI and thus the initial active BWP. Ex.1014, 68. The second kind of BWP, referred to as a “currently active BWP” or simply “active BWP,” provides a larger bandwidth for UEs to receive data in connected mode. *See* Ex.1014, 68, 88. It was known that the UE can switch between an active BWP and the initial BWP as the UE’s need for bandwidth changes. Ex.1010, ¶0272;

Ex.1003, ¶¶40-41.

An active BWP, however, typically does not carry RMSI. Ex.1001, 1:33-41; Ex.1012, Fig.1; Ex.1010, ¶¶0290, 0299. It was thus known to make RMSI (SIB1) available in the same frequency location for all UEs—*i.e.*, the initial active BWP—so it can be located no matter what frequency band or bandwidth is currently being used. Ex.1003, ¶42. A POSITA thus would have known that the UE would switch to this initial active BWP when updated RMSI is available. Ex.1008, 7:41-53; Ex.1003, ¶43.

The annotated figure below illustrates a 5G configuration of an initial active BWP (labeled BWP1), which carries RMSI, and other active BWPs (BWP2 and BWP3). *See* Ex.1012, Fig.1. The active BWPs (BWP2 and BWP3) carry certain control information (paging messages) and other connected-mode data but do not carry RMSI. *See* Ex.1010, ¶¶0290, 0297, 0299, 0376; Ex.1003, ¶44.



Ex.1012, Fig.1 (annotated to include Ex.1010, ¶¶0290, 0297, 0376); Ex.1003, ¶44.

C. System Information (SI) Updates

It was commonly known that in 5G networks, a connected-mode UE may receive a paging message notification that the SI has been updated or changed. Ex.1007, 1-2; Ex.1027, 4:7-12. In response to the SI update notification, the UE may then reacquire RMSI (SIB1) according to the frequency scheduling information in MIB, since the UE's stored SIB1 or other SIBs may no longer be valid. Ex.1007, 2-3; Ex.1008, 7:41-53. The background of the '238 patent itself explains this known concept. Ex.1001, 1:36-39; Ex.1003, ¶45.

It was also commonly known that the UE could switch between configured BWPs using one or more of any common broadcast and/or multicast signaling methods. Ex.1008, 7:41-47. In particular, it was known for a BWP switch to occur

based on a broadcasted paging message used for system information update; once the UE receives the SI update paging message, it automatically or autonomously switches BWPs to the initial active BWP. *See* Ex.1008, 7:41-53, 8:50-53; Ex.1010, ¶¶0297, 0299, 0376; Ex.1003, ¶47.

V. BACKGROUND OF THE '238 PATENT

The '238 patent generally relates to a “user equipment (UE) for wireless communication” that needs to update its stored system information (SI) upon “receiving a system information change indication.” Ex.1001, Abstract.

The '238 patent is directed in part to a “5G Access Network,” in which frequency bandwidth is partitioned into BWPs. Ex.1001, 3:49-50, 1:25-30. The Background section describes it was known in 5G networks that a UE can be configured for one or more downlink (DL) BWPs but only uses one “active DL BWP” at a time. Ex.1001, 1:25-30. According to the '238 patent, “an initial active DL BWP is defined as the frequency location and bandwidth dedicated for broadcasting remaining minimum SI (RMSI).” Ex.1001, 1:33-35.

The '238 patent's Background section further describes *it was already known that the UE may need to switch BWPs in response to receiving a SI change indication:*

When the NW sends to a Connected_UE a system information (SI) change indication that **notifies of system information change, the**

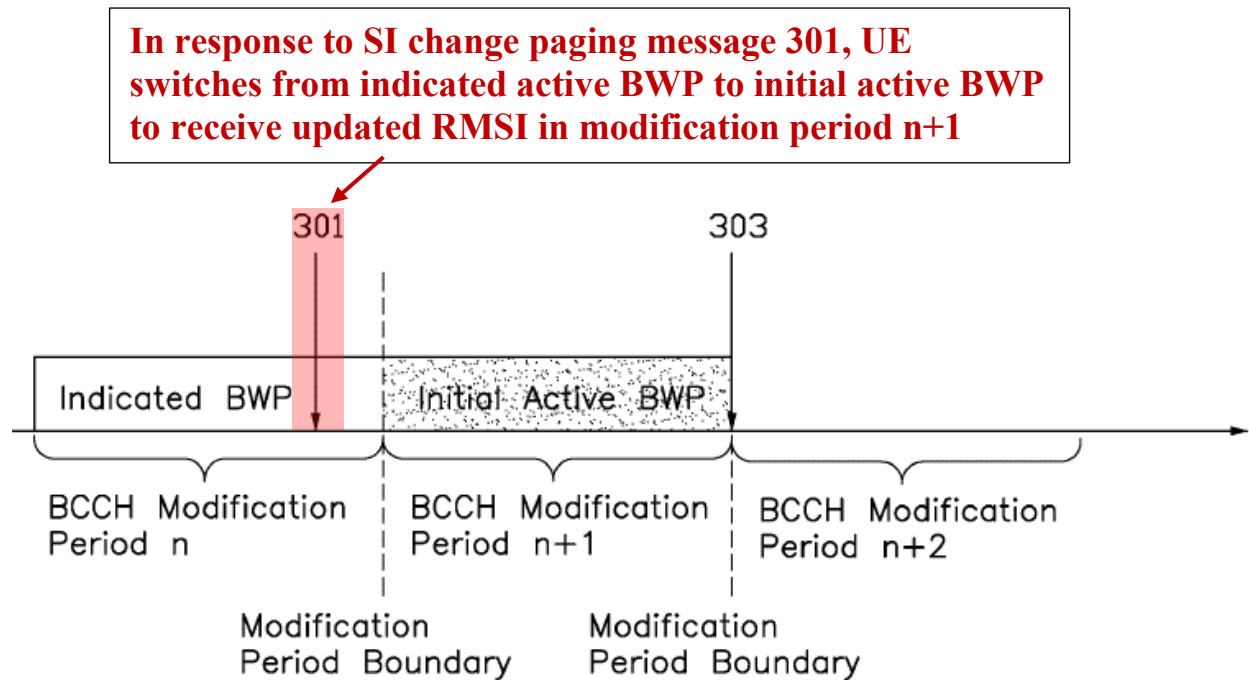
Connected UE may have to switch from the currently active BWP to the initial active BWP for accessing the RMSI and updating to the changed SI if there is no SI broadcasting on the currently active BWP.

Ex.1001, 1:35-41. However, the limitation added in the last claim amendment before allowance—“*in response to receiving the SI change indication, switching from the currently active BWP to an initial active BWP for an SI update*”—is this exact same functionality quoted above and described in the Background section as already being known to POSITAs. Ex.1001, 12:49-51; Ex.1002, 163, 187. The prior art discussed below confirms that this technique was already known. *See, e.g.*, Ex.1008, 7:41-53, 8:50-53; Ex.1010, ¶¶0290, 0297, 0299.

Further, the '238 patent's background section incorrectly suggests it was only known to use a “single scheduled downlink control information (DCI)” for “switching one active BWP to another.” Ex.1001, 1:31-32. Again, the prior art confirms it was known for a UE to switch BWPs upon receiving a broadcasted SI update paging message (as opposed to a scheduled DCI). *See, e.g.*, Ex.1008, 7:41-53.

The '238 patent also describes receiving the updated RMSI “during a next modification period” followed by “receiv[ing] the required changed SIBs [system information blocks].” Ex.1001, 2:7-9, 2:13. For instance, Fig.3 below illustrates a UE switching from an active BWP to the initial BWP for modification period $n+1$,

to get updated SIBs, after receiving an SI change indication paging message 301 in modification period n. Ex.1001, Fig.3, 6:17-34; Ex.1003, ¶¶48-52.



Ex.1001, Fig. 3 (annotated); Ex.1003, ¶52.

However, these concepts of using modification periods to demarcate SI updates and using a paging message for the SI update notification were known and used in the prior generation 4G (LTE) network. *See, e.g.*, Ex.1015, 1 (“NR can take the modification period concept in LTE as the baseline for NR SI change. ... In LTE [] Paging message is used to notify the [] UEs in RRC_CONNECTED about the system information change.”); Ex.1003, ¶53.

VI. PROSECUTION HISTORY

The '238 patent was filed in the U.S. on Nov. 15, 2018 as application no.

16/191,465 and claims priority to provisional application no. 62/586,598 filed on Nov. 15, 2017. It is unnecessary to determine whether the '238 patent is entitled to its earliest alleged priority date of Nov. 15, 2017 because the prior art relied upon herein pre-dates this date.

During a brief prosecution, the Patent Office issued a single office action rejecting as obvious the independent claims. Ex.1002, 197-208. To overcome the office action, Applicant amended the independent claims to add the underlined language: “*receiving a [SI] change indication ... in response to receiving the SI change indication, switching from the currently active BWP to an initial active BWP for an SI update.*” Ex.1002, 187. In response to this amendment, the Patent Office issued a notice of allowance and the '238 patent issued on August 11, 2020. Ex.1002, 163, 137; Ex.1003, ¶¶54-55.

VII. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art (“POSITA”) in the field of the '238 patent, as of Nov. 15, 2017, would have been someone knowledgeable and familiar with the cellular telecommunications arts that are pertinent to the '238 patent. That person would have at least a master’s degree in electrical engineering, computer engineering, computer science, or a related field from an accredited program and one year of relevant experience in mobile communications or wireless networks. A Ph.D. degree in a relevant field may substitute for some work experience. Ex.1003,

¶¶19-21.

VIII. CLAIM CONSTRUCTION

In an *inter partes* review, claims “shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. § 42.100(b).

However, only those claim terms that are in controversy need to be construed, and only to the extent necessary to resolve the controversy. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017); *see also Samsung Electronics Co., Ltd. v. Smart Mobile Technologies, Inc.*, IPR2022-01248, Paper 13, at 58-60 (PTAB Jan. 24, 2023) (explaining that it is “not uncommon” for a petitioner to advance different constructions in district court and before the Board; for example, a petition may “present[] an unpatentability argument based on a broader construction, such as one advanced by a patent owner that is seeking to broadly construe the claims to prove

infringement”).¹ For example, although there is a dispute in the district court that the preamble of claim 1 is limiting (*see* Exs. 1031-1033), the dispute is irrelevant for this proceeding because that dispute is not in controversy in light of the prior art relied upon in this instant Petition, which discloses or renders the preamble obvious. Petitioner submits that for the purposes of this proceeding, the terms of the challenged claims should be given their plain and ordinary meaning, and no terms require specific construction in this proceeding. Ex.1003, ¶56.

Petitioner does not concede that any term in the challenged claims meets the requirements of 35 U.S.C. § 112 or that the challenged claims recite patentable subject matter under 35 U.S.C. § 101. The prior art renders obvious the claims under their plain and ordinary meaning, which is Patent Owner’s construction of all disputed claim terms of the ’238 patent in the district court. *See e.g.*, Ex.1031, 6-14.

¹ The parties have filed claim construction briefs in district court (*see* Exs. 1031-1033) but there has been no claim construction decision to date nor is there likely to be one as of the time of institution due to the parties’ agreement that the district court case should be transferred (*see* Ex.1029, 3).

IX. RELIEF REQUESTED AND THE REASONS FOR THE REQUESTED RELIEF

Petitioner asks that the Board institute a trial for *inter partes* review and cancel the Challenged Claims.

X. IDENTIFICATION OF HOW THE CLAIMS ARE UNPATENTABLE

A. Challenged Claims

Petitioner challenges claims 1-5 and 11-15, which are asserted by Patent Owner in the related district court litigation. Ex.1022, 1.

B. Statutory Grounds for Challenges

Grounds	Claim(s)	Basis
#1	1-2, 4-5, 11-12, 14-15	35 U.S.C. 103 obvious over ITRI in view of Liao and Jeon
#2	3, 13	35 U.S.C. 103 obvious over ITRI in view of Liao , Jeon , and Huawei

ITRI: 3GPP TSG RAN WG2 Meeting #99bis R2-1711767, “Discussion on the granularity of SI change notification,” Source: ITRI (“ITRI,” Ex.1007). ITRI was uploaded to the 3GPP FTP site and available to the public by Sept. 29, 2017. Ex.1005, ¶¶46-52. ITRI is prior art under 35 U.S.C. § 102(a)(1).²

² Apple does not concede that any aspect of a 3GPP document was actually implemented in any version of the 5G NR Standard.

Liao: U.S. Patent No. 10,505,803 to Liao (“Liao,” Ex.1008). Liao was filed Jun. 14, 2018 and claims priority to U.S. Provisional Patent Application No. 62/544,118 to Liao (“Liao Provisional,” Ex.1009), filed Aug. 11, 2017. Liao issued Dec. 10, 2019. Liao is prior art under 35 U.S.C. § 102(a)(2). Liao’s subject matter relied upon in the challenges herein is entitled to the Aug. 11, 2017 priority date, as shown in the chart in Dr. Ding’s declaration, Ex.1003, ¶¶183-184, and as also shown by the parallel citations to the Liao provisional in the claim mapping section. *Apple Inc. v. Telefonaktiebolaget LM Ericsson*, IPR2022-00341, Paper 10, 19 (Sept. 14, 2022) (quoting 35 U.S.C. § 102(d)(2) (“under the AIA ... the provisional [] to which the reference patent document claims a right of priority must ‘describe[] the subject matter’ relied upon in the reference patent document as prior art”)).

Jeon: U.S. Patent Pub. No. 2019/0132824 to Jeon *et al.* (“Jeon,” Ex.1010). Jeon was filed Oct. 26, 2018 and claims priority to U.S. Provisional Patent Application No. 62/577,995 to Jeon *et al.* (“Jeon Provisional,” Ex.1011), filed Oct. 27, 2017. Jeon published May 2, 2019. Jeon is prior art under 35 U.S.C. § 102(a)(2). Jeon’s subject matter relied upon in the challenges herein is entitled to the Oct. 27, 2017 priority date as shown in the chart in Dr. Ding’s declaration Ex.1003, ¶¶181-182, and as also shown by the parallel citations to the Jeon provisional in the claim mapping section.

Huawei: 3GPP TSG RAN WG1 NR Ad Hoc Meeting R1-1709972, “Overview of wider bandwidth operations,” Source: Huawei, HiSilicon (“Huawei,” Ex.1012). Huawei was uploaded to the 3GPP FTP site and available to the public by Jun. 17, 2017. Ex.1005, ¶¶53-60. Huawei is prior art under 35 U.S.C. § 102(a)(1).

Petitioner’s analysis also cites additional prior art to demonstrate 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. *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); *see also K/S HIMPP v. Hear-Wear Techs., LLC*, 751 F.3d 1362, 1365-66 (Fed. Cir. 2014); *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1363 (Fed. Cir. 2016).

C. Ground 1: Claims 1-2, 4-5, 11-12, and 14-15 are obvious under 35 U.S.C. § 103 over ITRI in view of Liao and Jeon

1. Summary of ITRI

ITRI describes “SI change notification” in the context of 3GPP’s 5G working group meetings. Ex.1007, 1-2; Ex.1003, ¶60; Ex.1005, ¶¶46-52.

ITRI teaches that, “[u]pon system information change, the change could be notified from gNB to UE (e.g., by paging message).” Ex.1007, p.2. In response to

receiving the “SI change notification” paging message, the “UE acquires the latest SIB1 from gNB according to the SIB1 scheduling information.” Ex.1007, 2. SIB1 is included within the RMSI, and the UE can receive “RMSI scheduling information” such as the “[t]ime/frequency resource configuration” of where RMSI is scheduled. Ex.1007, 1.

By reading SIB1 within RMSI, “the UE can identify the changed SIBs and acquire the updated SIBs accordingly.” Ex.1007, 2. The RMSI also includes a master information block (MIB), which has the scheduling information for these SIBs (other than SIB1). Ex.1007, 2; Ex.1003, ¶¶61-62.

Fig.1 below illustrates a UE receiving “SI change notification in a modification period and acquir[ing] the updated SIB in the next modification period.” Ex.1007, Fig.1, 2.

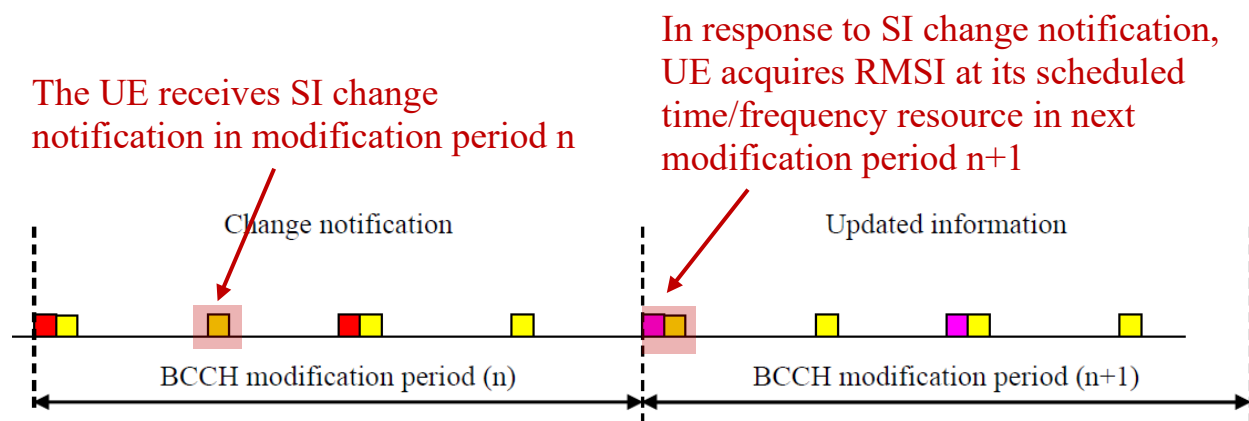


Figure 1. Change of system Information

Ex.1007, Fig.1 (annotated); Ex.1003, ¶63.

2. Summary of Jeon

Jeon teaches methods for 5G “paging control for a system information update.” Ex.1010, ¶0297; Ex.1011, ¶00185.

Jeon teaches configuring “an initial active DL BWP for a transmission of RMSI.” Ex.1010, ¶0276; Ex.1011, ¶¶00154-155. In more detail, Jeon explains that one “configured DL bandwidth parts for a PCell may comprise a CORESET with a CSS [common search space] type for RMSI.” Ex.1010, ¶0297; Ex.1011, ¶00185. Here, a “CORESET” refers to control signaling resources carried by the BWP; and a “search space” refers to the time and frequency portion of the BWP that is monitored for potential transmissions from the base station. *See* Ex.1014, 67-69; Ex.1010, ¶¶0286, 0290. Thus, Jeon describes configuring an initial active BWP with a search space for carrying RMSI. Ex.1010, ¶¶0276, 0290; Ex.1011, ¶¶00154-155, 169, 174.

Jeon further describes that, in another active BWP, a different search space called a “[g]roup common search space (GCSS)” can be used **“as an alternative to CSS for certain information.”** Ex.1010, ¶0290. For instance, “paging control may be transmitted on GCSS.” Ex.1010, ¶0290. As an example of “paging control,” Jeon describes “paging control for system information update.” Ex.1010, ¶0297; Ex.1011, ¶¶00174, 185.

Therefore, Jeon teaches an active BWP carrying system information update

paging messages, which the UE can monitor instead of monitoring a search space in the initial active BWP for such messages. Ex.1010, ¶¶0276, 0290, 0297. Indeed, Jeon states that a UE “may monitor GCSS” in an active BWP, which carries SI update pages, “instead of switching to the BWP containing the CSS for such information”—that is, instead of switching to the initial active BWP for SI update pages or RMSI itself. Ex.1010, ¶0290; Ex.1011, ¶¶00154-55, 174, 185. A POSITA would have understood that Jeon thus describes a UE monitoring for SI update pages in a search space of an active BWP, instead of monitoring for such pages or the updated RMSI itself in a search space of the initial active BWP. Ex.1003, ¶¶64-67.

Jeon further teaches that a UE can “switch a BWP” to receive “a control channel for RMSI” on the “initial DL BWP”:

[A]n initial DL BWP may comprise a control channel for RMSI, OSI, and/or paging. The wireless device may switch a BWP to monitor such a control channel.

Ex.1010, ¶0299; Ex.1011, ¶00189. A POSITA thus would have understood Jeon to describe a UE in an active BWP to switch to the initial BWP in order to receive RMSI (*see* Ex.1010, ¶¶0276, 0299). A POSITA also would have recognized that the switch to the initial active “for RMSI” (*see* Ex.1010, ¶0299) would be in response to an SI update paging message (*see* Ex.1010, ¶¶0290, 0297). Ex.1003,

¶68.

To summarize, Jeon describes configuring: 1) a currently active BWP with a search space carrying paging control for a system information update, 2) an initial active BWP with a search space carrying RMSI, and 3) a UE switching BWPs to acquire RMSI on the initial BWP. Ex.1010, ¶¶0276, 0290, 0297, 0299. This configuration described in Jeon, with RMSI only carried in the initial active BWP, was well known in the art. Ex.1003, ¶69 (citing Ex.1010, ¶¶0290, 0297, 0299; Ex.1012, Fig.1). For instance, Huawei, which was also presented at the 5G working group meetings, illustrates a configuration where RMSI is only located in the first active BWP (BWP1), which does not overlap with the other active BWPs (BWP2 or BWP3). Ex.1012, Fig.1.

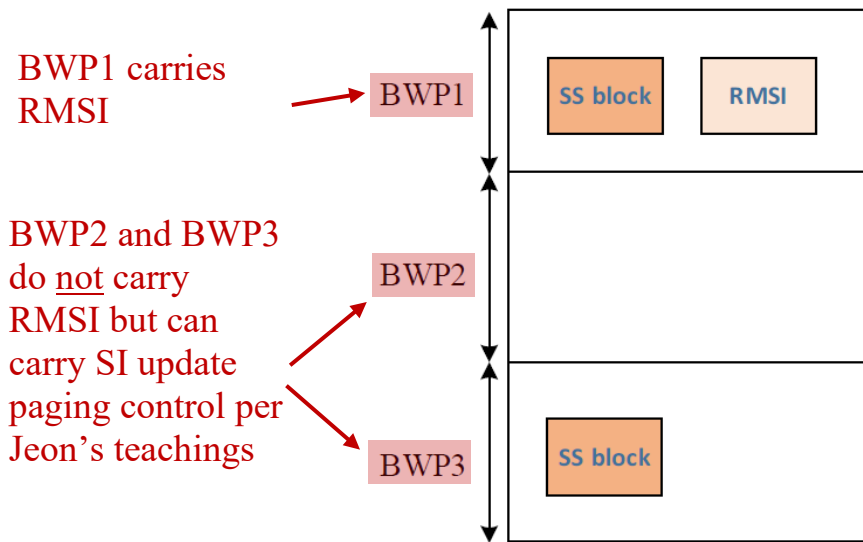


Figure 1 Three types of bandwidth part

**Ex.1012, Fig.1 (annotated to include
Ex.1010, ¶¶0290, 0297); Ex.1003, ¶69.**

3. Reasons to Combine ITRI and Jeon

For the reasons set forth below, a POSITA would have been motivated to combine the teachings of ITRI with Jeon. Ex.1003, ¶70. In particular, before the priority date of the '238 patent, it would have been obvious, beneficial, and predictable to utilize Jeon's teachings regarding multiple BWPs in combination with the system of ITRI. Ex.1003, ¶70. In the resulting combination, ITRI's system for obtaining updated RMSI in the next modification period in response to an SI update paging message would include Jeon's teachings regarding SI updates using multiple BWPs. A UE in ITRI's system obtains updated RMSI in response to a

broadcasted SI update paging message; and, as taught by Jeon, the UE receives the SI update paging message in a currently active BWP and switches to the initial active BWP to obtain RMSI. Ex.1003, ¶70 (citing Ex.1007, 1-2; Ex.1010, ¶¶0276, 0290, 0297, 0299).

As an initial matter, one of ordinary skill in the art when considering the teachings of ITRI would have naturally considered the teachings of Jeon, as Jeon is also analogous prior art pertaining to the same field of endeavor as both ITRI and the '238 patent, namely, cellular telecommunications. *See* Ex.1007, 1; Ex.1010, Abstract. Specifically, both references, like the '238 patent, describe SI acquisition in the context of 5G. Ex.1007, 2; Ex.1010, ¶0297. ITRI and Jeon are also reasonably pertinent to the particular problem of the '238 patent, such as SI acquisition procedures to reduce network load in 5G. Ex.1007, 1-2; Ex.1010, ¶¶0290, 0297, 0299; Ex.1003, ¶71.

One of ordinary skill in the art would have been specifically motivated to incorporate Jeon's teachings regarding BWPs into the system of ITRI. ITRI describes a temporal sequence of messages for updating system information in 5G systems; however, ITRI does not explicitly address the aspect that there are multiple BWPs in 5G networks. A POSITA would have been motivated to supplement ITRI's teachings with compatible teachings regarding system information updates and multiple BWPs, such as in Jeon. Ex.1003, ¶72.

In more detail, ITRI describes SI updates in the context of 5G, where RMSI (*i.e.*, SIB1) is scheduled in a particular time/frequency resource. Ex.1007, 1. Upon receiving an “SI change notification” via “paging message,” where “the notification is not SIB-specific” (*i.e.*, broadcast), the UE acquires the RMSI/SIB1 “according to the SIB1 scheduling information carried in MIB.” Ex.1007, 2. However, a well-known aspect of 5G systems is not discussed in ITRI: bandwidth parts (BWPs). Ex.1003, ¶73 (citing Ex.1014, 68).

One of ordinary skill in the art would have been specifically motivated to incorporate Jeon’s or similar techniques into ITRI because doing so would thereby address this well-known aspect of 5G systems: configuring a UE for multiple BWPs. Ex.1003, ¶74. While ITRI does not discuss BWPs, at that time in late 2017, it was already established by the 5G working group that the first publicly accessible version of the upcoming 5G system would support multiple BWPs. Ex.1014, 88. Further, the 5G working group agreed that the initial BWP would, by definition, be the frequency-band location of RMSI. Ex.1014, 68; Ex.1003, ¶74.

Configuring UEs and the network for multiple BWPs, with RMSI being carried only in the initial BWP, as taught by Jeon, was already well known in the art. Ex.1003, ¶75 (citing Ex.1010, ¶¶0290, 0297, 0299; Ex.1012, Fig.1). For instance, as discussed above, the Huawei reference was also presented at the 5G working group meetings and teaches RMSI is carried in only one of three BWPs.

Ex.1012, Fig.1.

In light of ITRI omitting details about this known aspect of 5G—*i.e.*, multiple BWPs—a POSITA would have looked to augment ITRI's system for SI update in 5G with a known technique for dealing with multiple BWPs. Ex.1003, ¶76. Jeon provides that technique. Jeon's technique provides a bandwidth-efficient BWP configuration (*i.e.*, a currently active BWP carrying SI update pages and an initial active BWP carrying RMSI) that can be used for carrying out ITRI's technique (*i.e.*, obtaining RMSI, at the frequency band identified in MIB, response to a broadcasted SI update page). Ex.1003, ¶76 (citing Ex.1007, 1-2; Ex.1010, ¶¶0290, 0297).

Therefore, it would have been obvious to make this combination because doing so allows ITRI's technique to be applied to a network and UE configured for multiple BWPs, as was already known to be a feature of the 5G network described by ITRI. Ex.1003, ¶77 (citing Ex.1008, 7:41-53, 8:50-53; Ex.1009, 24-26; Ex.1012, Fig.1; Ex.1014, 68). POSITAs understood that ITRI was presented to 5G working group meetings, where it was already decided to configure a UE with multiple BWPs. Ex.1010, ¶¶0290, 0297, 0299; Ex.1014, 68; Ex.1003, ¶77. It was thus obvious to a POSITA that, when a UE obtains changed RMSI in response to a paging notification, as taught by ITRI—the UE may receive the SI update page in an active BWP and then switch to the initial BWP for the RMSI, as taught by Jeon.

Ex.1007, 1-2; Ex.1010, ¶¶0276, 0290, 0297, 0299.

A POSITA also would have been motivated to integrate Jeon's technique into ITRI's system because of the compatibility and similarity of their teachings. Ex.1003, ¶78. Each reference describes a 5G UE obtaining RMSI from its scheduled frequency resource as well as an SI update paging notification. Ex.1007, 1-2; Ex.1010, ¶¶0290, 0297. In one example implementation of this combination, a POSITA would have found it obvious to modify ITRI's UE such that it switches BWPs in response to receiving the SI change paging notification, per Jeon. Ex.1003, ¶78 (citing Ex.1007, Fig.1; Ex.1010, ¶¶0290, 0297).

A POSITA would have found it particularly advantageous to include Jeon's teaching in ITRI because, while ITRI teaches time-domain aspects of SI update, Jeon provides frequency-domain aspects. Ex.1003, ¶79. Specifically, ITRI's system describes a UE's timing for obtaining RMSI in response to an SI change paging notification—*i.e.*, in the next modification period $n+1$. Ex.1007, 1-2. Meanwhile, Jeon describes the frequency-space configuration for SI updates—*e.g.*, an initial BWP carrying RMSI and an active BWP carrying SI update paging messages, so that the UE does not need to monitor the initial BWP for such pages or the RMSI itself. Ex.1010, ¶¶0276, 0290, 0297; Ex.1003, ¶79.

A POSITA would have been motivated to make this combination because it was well known that the network may advantageously avoid transmitting RMSI in

all possible BWPs, and send paging messages in active BWPs instead, in order to save downlink resources. *See, e.g.*, Ex.1010, ¶0297; Ex.1003, ¶80. For instance, it was known to be beneficial if the UE could instead switch BWPs to obtain RMSI only when necessary, such as in response to an SI change or update. *See, e.g.*, Ex.1010, ¶0297, ¶290 (“[P]aging control may be transmitted on GCSS. The wireless device may monitor GCSS, for example, instead of switching to the BWP containing the CSS [and RMSI] for such information.”); Ex.1016, ¶0173 (“A [UE] (*e.g.*, in connected state) may monitor a paging channel (*e.g.*, only) for system information update[.]”); Ex.1003, ¶80.

It was similarly known to be advantageous that “BWP switching is generally triggered when there is a data traffic which should be transmitted via other BWP not the current BWP.” Ex.1021, 3. Indeed, it was known that RMSI should be transmitted on an initial active BWP as opposed to all active BWPs. *See* Ex.1014, 68; Ex.1012, Fig.1. It thus would have been obvious for a UE in ITRI’s system to switch BWPs in response to a paging message indicating an RMSI update. *See* Ex.1008, 7:41-53; Ex.1009, 24-25; Ex.1003, ¶81.

This combination would have been predictable and advantageous because the UE’s active BWP advantageously only transmits a paging notification that the RMSI has been updated. Ex.1003, ¶82 (quoting Ex.1010, ¶0290). This is advantageous compared to other alternatives such as repeatedly transmitting the

RMSI on each and every active BWP, which would consume the network's downlink transmission resources. Ex.1003, ¶82 (citing Ex.1012, 1-2). The UE can advantageously just monitor for SI update pages “instead of switching to the BWP containing the CSS for such information” such as the updated RMSI itself; this allows the UE to avoid unnecessarily switching to the initial active BWP for RMSI, and also avoid reacquiring and processing the RMSI, in the situations when an updated RMSI is not needed (*i.e.*, no SI update paging message received). Ex.1010, ¶¶0242, 0290.

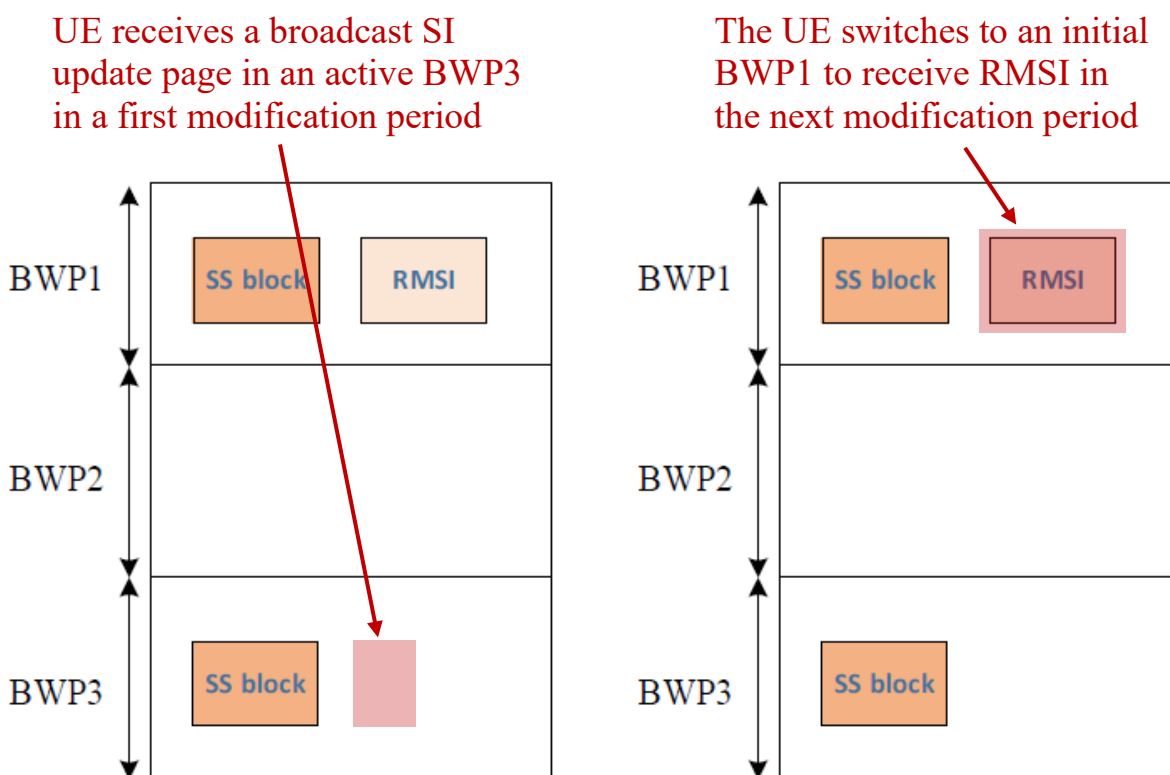
A POSITA also would have made this combination because Jeon's teachings beneficially allow the UE to always locate and obtain RMSI by switching to the initial active BWP, which also advantageously allows the system to treat this BWP as a “default BWP.” Ex.1010, ¶0275; Ex.1003, ¶83. Jeon explains, “a wireless device (e.g., RRC IDLE wireless device) may fall back to an initial BWP” when necessary or by default, as “[a] default BWP on a PCell may be an initial active DL BWP for a transmission of RMSI.” Ex.1010, ¶¶0275-0276; Ex.1003, ¶83.

Not only would utilizing Jeon's multiple BWP configuration in ITRI's system have been advantageous, but a POSITA would have also found the combination predictable and would have had a reasonable expectation of success, for several reasons. Ex.1003, ¶84. For instance, this combination was described in other references as well. Yi (Ex.1013) describes UE procedures for multiple

BWPs, which Yi also refers to as “subbands.” Ex.1013, ¶¶0113. Similar to Jeon, Yi explains that, where the system does not periodically transmit SIB and instead transmits a “system update indication,” for “SIB transmission, a UE may retune to anchor subband.” Ex.1013, ¶0284. Yi describes that a UE may receive an SI update notification and, in response, switch to the anchor BWP (*i.e.*, initial active BWP) to obtain the SIBs (*i.e.*, at least RMSI). Ex.1013, ¶0284.

In sum, Jeon’s technique provides a BWP configuration (*i.e.*, an active BWP for SI update pages and an initial BWP for RMSI) that can be implemented in ITRI’s system—which includes a UE receiving an SI update notification in one modification period and the updated RMSI/SIB in the next modification period. Ex.1007, 1-2; Ex.1003, ¶85. Therefore, a POSITA would have been motivated to incorporate Jeon’s teachings into ITRI because it provides further implementation details regarding SI update in the context of multiple BWPs. Ex.1003, ¶85.

To illustrate, Fig.1 of Huawei has been duplicated and annotated below to illustrate the combination of ITRI with Jeon. Ex.1007, 1-2; Ex.1010, ¶¶0290, 297; Ex.1012, Fig.1. As illustrated, in the first modification period (left), the UE receives in an active BWP a paging message indicating an SI update is available; then, the UE switches to the initial BWP to receive the updated RMSI in the next modification period (right). Ex.1007, 1-2; Ex.1010, ¶¶0290, 297; Ex.1012, Fig.1; Ex.1003, ¶86.



Ex.1012, Fig.1 (duplicated and annotated to include teachings of Ex.1007 and Ex.1010); Ex.1003, ¶86.

A POSITA also would have found the combination predictable and had an expectation of success because it was already well known in the art for RMSI to be carried only in the initial active BWP while other active BWPs carry SI update paging messages. Ex.1003, ¶87 (citing Ex.1012, Fig.1; Ex.1020, Fig.4; Ex.1019, 6). For instance, MediaTek (Ex.1019) describes a similar implementation. In MediaTek, “one of configured DL bandwidth parts includes [a search space] for RMSI,” while “each configured DL bandwidth part includes [a search space] for ... paging control for system information update[.]” Ex.1019, 6. Thus, like Jeon,

MediaTek describes a BWP configuration with SI update pages received on a currently active BWP and RMSI received on another (*i.e.*, initial active) BWP. *See* Ex.1019, 6; Ex.1014, 68.

A POSITA thus would have also found the combination predictable and would have had a reasonable expectation of success, as the combination does not change the intended functionality of either ITRI's or Jeon's technique. For instance, a POSITA would have expected success as ITRI's technique was specifically intended to be implemented in a 5G system, which was known to support multiple BWPs, as described by Jeon. Ex.1007, 1-2; Ex.1010, ¶0290; Ex.1003, ¶88.

Accordingly, a POSITA would have found it obvious to apply Jeon's teachings to ITRI because the combination merely amounts to implementing a known 5G BWP configuration technique to the 5G system of ITRI. Ex.1003, ¶89.

To the extent Jeon does not explicitly state that the UE switches BWPs after receiving an SI update paging message, it would have been obvious to a POSITA in view of Jeon, and Liao explicitly provides these obvious details. Ex.1003, ¶90.

4. Summary of Liao

Liao describes "system information update" in the context of 5G. Ex.1008, 1:62-67, 7:48-52. Liao describes how "the UE can switch among configured BWPs" including "for system information update." Ex.1008, 7:41-42, 7:51-52;

Ex.1009, 24-26; Ex.1003, ¶91. For instance, if “the current active BWP for the UE does not include a CORESET with CSS, the UE can switch its active BWP to the one including a CORESET with CSS ... for the monitoring of broadcast message, such as SI.” Ex.1008, 8:49-53; Ex.1009, 26.

In particular, Liao teaches that a UE can switch BWPs based on a variety of signaling techniques: “BWP switch can be based two or more combined methods including a higher-layer signaling, such as the RRC-layer signaling or a MAC CE; a physical-layer signaling, such as the DL control information (DCI).” Ex.1008, 7:43-47. Also, the BWP switch signaling can be a “broadcast and/or multi-cast message includ[ing] ... paging control for system information update.” Ex.1008, 7:44-51; Ex.1009, 24-25; Ex.1003, ¶92.

5. Reasons to Combine ITRI and Jeon with Liao

For the reasons set forth below, a POSITA would have been motivated to combine the teachings of ITRI and Jeon with Liao. Ex.1003, ¶93. In particular, before the priority date of the '238 patent, it would have been obvious, beneficial, and predictable to utilize Liao's teachings in combination with the ITRI-Jeon system. For example, Liao teaches a UE switching BWPs in response to an SI update page; this allows a UE to obtain the updated RMSI in its scheduled time/frequency resource, in the next modification period, as taught by ITRI. Ex.1007, 2; Ex.1008, 7:41-53. Further, this allows the UE to switch from an active

BWP carrying SI update paging messages to the initial BWP carrying RMSI, as taught by Jeon. *See* Ex.1010, ¶¶0276, 0290, 0297. Liao thereby provides a simple, predictable, and compatible technique for when the updated RMSI is carried in a different BWP than the active BWP: in response to receiving the SI update page, the UE switches to the initial BWP to obtain the updated RMSI. Ex.1008, 7:41-53; Ex.1003, ¶93.

As an initial matter, one of ordinary skill in the art when considering the teachings of ITRI and Jeon would have naturally considered the teachings of Liao as they are all analogous prior art to and pertain to the same field of endeavor as the '238 patent, namely, cellular telecommunications. *See* Ex.1007, 1; Ex.1008, Abstract. Specifically, all three references, like the '238 patent, describe SI acquisition in the context of 5G. Ex.1007, 2; Ex.1008, 1:62-67, 7:48-52; Ex.1010, ¶0290. Liao is also reasonably pertinent to the particular problem of the '238 patent, such as SI acquisition procedures to reduce network load in 5G. Ex.1007, 1; Ex.1008, Abstract; Ex.1003, ¶94.

In more detail, ITRI and Jeon describe a system that a POSITA would have looked to Liao for compatible implementation details. As discussed above, ITRI describes SI updates in the context of 5G. Ex.1007, 1. And Jeon describes a well-known BWP configuration for 5G, with SI update paging on a currently active BWP and RMSI on an initial active BWP. Ex.1003, ¶95 (citing Ex.1010, ¶¶0276,

0290, 0297; Ex.1014, 68). One of ordinary skill in the art would have been specifically motivated to incorporate Liao's or similar techniques into the system of ITRI and Jeon because doing so would thereby address this well-known aspect of SI update paging in the context of multiple BWPs: the UE switches to the initial BWP in response to a broadcasted SI update paging message. Ex.1003, ¶96 (citing Ex.1008, 7:41-53; Ex.1010, ¶¶0290, 0297; Ex.1012, Fig.1).

In more detail, Jeon describes configuring an active BWP with paging control for a system information update and an initial active BWP carrying RMSI, as discussed above at Section X.C.2. Ex.1010, ¶¶0290, 0297. In Jeon, because the RMSI is located on a fixed BWP that does not change, a POSITA would have found it obvious that a connected-mode UE receiving the SI update indicator on the currently active BWP triggers a switch to the initial active BWP to get the updated RMSI. *See* Ex.1010, ¶0290; Ex.1003, ¶96.

However, to the extent Jeon does not explicitly state that the UE switches BWPs after receiving an SI update paging message, Liao provides these obvious details. Ex.1003, ¶97 (citing Ex.1008, 7:41-53; Ex.1010, ¶¶0290, 0297). A POSITA thus would have looked to augment the ITRI-Jeon system for SI update in 5G with a known technique for BWP switching: a broadcasted paging message indicating an SI update is available. Ex.1003, ¶97. Liao provides that technique. Specifically, Liao teaches that various types of signaling can be used to instruct a

UE to switch BWPs (Ex.1008, 7:41-47); and as one advantageous example, the UE can receive a broadcast including a system information update paging message (Ex.1008, 7:48-51). Ex.1003, ¶97.

Therefore, it would have been obvious to make this combination because Liao merely provides explicit details of UE behavior in the system of ITRI and Jeon. Ex.1003, ¶99 (citing Ex.1008, 7:41-53). It was thus obvious to a POSITA that, when a UE obtains changed RMSI in response to a paging notification as taught by ITRI—and the active BWP includes the page whereas the initial BWP carries RMSI, per Jeon—the UE may switch BWPs to obtain the RMSI in response to the SI change paging message, as taught by Liao. Ex.1007, 1-2; Ex.1008, 7:41-53; Ex.1010, ¶¶0290, 0297; Ex.1003, ¶98.

A POSITA also would have been motivated to integrate Liao's technique into the system of ITRI and Jeon because of the compatibility and similarity of their teachings. Ex.1003, ¶99. All three references describe a 5G UE obtaining RMSI from its scheduled frequency resource in response to a SI update paging notification. Ex.1007, 1-2; Ex.1008, 7:41-53; Ex.1010, ¶¶0276, 0290, 0297; Ex.1003, ¶99. In one example implementation of this combination, a POSITA would have found it obvious to modify a UE in the system of ITRI, such that the UE switches BWPs in response to receiving the broadcasted SI change paging notification, per Jeon and Liao. Ex.1003, ¶99 (citing Ex.1007, Fig.1; Ex.1008,

7:41-53).

A POSITA would have found it particularly advantageous to include Liao's teaching in combination with ITRI because, while ITRI teaches time-domain aspects of SI update, Liao provides frequency-domain (*i.e.*, bandwidth) aspects. Ex.1003, ¶100. Specifically, ITRI's system describes a UE's timing for obtaining RMSI in response to an SI change paging notification—*i.e.*, in the next modification period. Ex.1007, 1-2. Meanwhile, Liao describes the UE's frequency response to the same SI change paging notification—*i.e.*, switch to the initial BWP. Ex.1008, 7:41-53; Ex.1003, ¶100. Indeed, this combination would have been predictable and advantageous because, as discussed above at Section X.C.3, the UE's active BWP advantageously only transmits a paging notification that the RMSI has been updated. Ex.1003, ¶101.

Not only would utilizing Liao's BWP switching technique in ITRI-Jeon's system have been advantageous, but a POSITA would have also found the combination predictable and would have had a reasonable expectation of success, for several reasons. Ex.1003, ¶102. For instance, this combination was described in other references as well. As described above at Section X.C.2, the Yi reference (Ex.1013), like Liao, explains that in response to receiving "system update indication," for "SIB transmission, a UE may retune to anchor subband," *i.e.*, initial BWP, to obtain the SIBs. Ex.1013, ¶0284.

The combination also would have been predictable with an expectation of success because the combination does not change the intended functionality of any of ITRI's UE performing an SI update procedure, Jeon's BWP configuration, or Liao's BWP switching technique. Ex.1003, ¶103. In fact, Liao's technique was *specifically intended* to be implemented in a 5G UE (such as ITRI and Jeon's 5G UE). See Ex.1007, 1; Ex.1008, 1:53-67; Ex.1010, Abstract; *see also* Ex.1013, ¶0284. Furthermore, the resulting combination would have been obvious, as the UE switching BWPs automatically or autonomously in response to the SI update paging message was one of only two options; indeed, the other option, where the UE waits for additional signaling to cause a BWP switch, would consume more network and UE resources. Ex.1003, ¶103.

Accordingly, a POSITA would have found it obvious to apply Liao's teachings to ITRI-Jeon's system because the combination merely amounts to applying a known BWP switching technique to a RMSI update technique and BWP configuration ready for improvement. Ex.1003, ¶104.

6. Claim 1

[1.0] *A method for a user equipment (UE) of a connected state, the method comprising:*

First, ITRI “discuss[es] the notification of SI change.” Ex.1007, 1. ITRI describes that “**upon system information change, the change could be notified**

from gNB to UE (e.g., by paging message)” (“*[a] method for a [UE]*”). Ex.1007, 2; Ex.1003, ¶105.

To the extent ITRI does not explicitly teach “*a user equipment (UE) of a connected state*,” it would have been obvious to a POSITA that ITRI’s teachings apply to “*connected*” UEs (e.g., UEs in RRC_connected mode); indeed, this limitation was well known to POSITAs as taught by Jeon, for example. Ex.1003, ¶106.

Second, like ITRI, Jeon describes “paging control for a system information update.” Ex.1010, ¶0297; Ex.1011, ¶185. Jeon further describes that a UE may be in an “active BWP for a user after a wireless device becomes **RRC connected**” (“*a [UE] of a connected state*”). Ex.1010, ¶0276; Ex.1011, ¶¶00154-155.

A POSITA would have found it obvious to combine the teachings of ITRI and Jeon at least for the reasons described above at Section X.C.5. Indeed, it was well known in the art that a “Paging message is used to notify the [] UEs in RRC_CONNECTED about the system information change.” Ex.1003, ¶107 (quoting Ex.1015, 1).

Thus, ITRI and Jeon render obvious the preamble. Ex.1003, ¶108.

[1.1] receiving a system information (SI) change indication broadcasted by a paging via a currently active bandwidth part (BWP) during a modification period;

First, ITRI teaches that, “[u]pon system information change, the change

could be notified from gNB to UE (e.g., by paging message).” Ex.1007, 1. ITRI explains that the “UE may receive multiple SI change notification in a **modification period** and acquire the updated SIB in the next modification period.” Ex.1007, 2. ITRI illustrates a UE receiving an SI change notification in a modification period in Fig.1 below. Ex.1007, Fig.1; Ex.1003, ¶109.

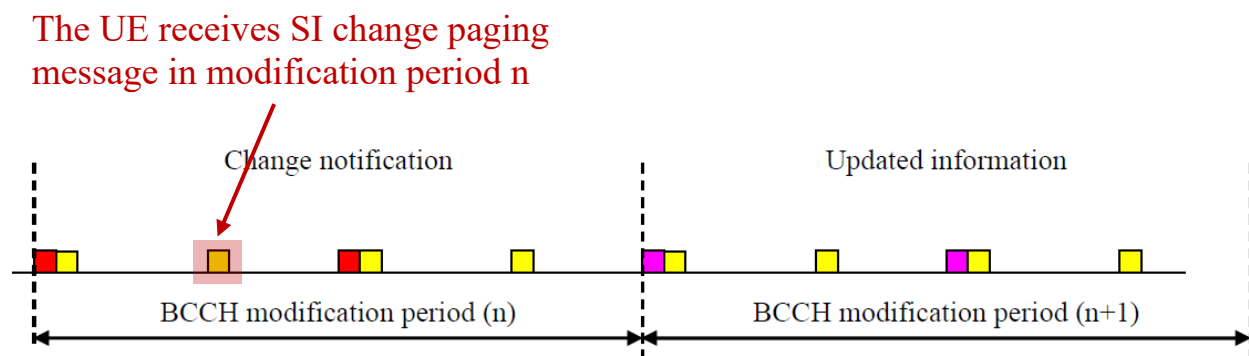


Figure 1. Change of system Information

Ex.1007, Fig.1 (annotated); Ex.1003, ¶109.

Therefore, ITRI teaches “*receiving a system information (SI) change indication [] by a paging ... during a modification period.*” Ex.1003, ¶110.

To the extent ITRI does not explicitly teach that the SI change page is “*broadcasted*” in an “*active bandwidth part (BWP)*,” it would have been obvious to a POSITA that ITRI’s SI “paging message” may be broadcasted in an active BWP. Ex.1003, ¶111. Indeed, these aspects were well known to POSITAs as taught by Liao and Jeon, for example.

Second, Liao teaches a UE receiving a “**broadcast** and/or multi-cast

message includ[ing] ... **paging control for system information update.**”

Ex.1008, 7:44-51; Ex.1009, 24-26. Therefore, Liao explains that an “*SI change indication*,” as described in ITRI, can be “*broadcasted by a paging.*” Ex.1007, 2; Ex.1008, 7:44-51; Ex.1009, 24-26; Ex.1003, ¶112.

Third, Jeon—like ITRI and Liao—describes “paging control for a system information update” in 5G. Ex.1010, ¶0297; Ex.1011, ¶00185. Jeon teaches a BWP configuration technique including “an initial active DL BWP for a transmission of RMSI” and “**an active BWP for a user after a wireless device becomes RRC connected.**” Ex.1010, ¶0276; Ex.1011, ¶¶00154-155. For instance, in an active BWP, a “base station may configure GCSS” and “paging control may be transmitted on GCSS.” Ex.1010, ¶0290; Ex.1011, ¶00174; Ex.1003, ¶113.

A POSITA would have found it obvious to combine the teachings of ITRI and Jeon at least for the reasons described above at Section X.C.5. In the resulting combination, the SI change page sent in a modification period, as taught by ITRI, is a broadcasted paging message, as taught by Liao. Ex.1007, 2; Ex.1008, 7:48-51; Ex.1009, 24-25; Ex.1003, ¶114. This broadcasted paging message can be received by a connected mode UE in an active BWP, per Jeon. Ex.1003, ¶114. Indeed, this combination would have been predictable with an expectation of success because it was also described in other prior art. Ex.1003, ¶114 (citing Ex.1015, 2-3 (“The change notification for the Minimum SI contained in PDSCH i.e. SIB1 [] should be

added in Paging message. ... [N]etwork will send the updated SI after the modification boundary[.]”)).

Thus, ITRI teaches a UE receiving an SI change notification paging message in a modification period, Liao teaches broadcasting a paging message for SI update, and Jeon teaches receiving the SI update paging message in an active BWP, which together renders obvious “*receiving a system information (SI) change indication broadcasted by a paging via a currently active bandwidth part (BWP) during a modification period.*” Ex.1003, ¶115.

[1.2] *in response to receiving the SI change indication, switching from the currently active BWP to an initial active BWP for an SI update;*

First, as discussed above at [1.1], ITRI teaches that a UE may receive an “**SI change notification**” including “by paging message.” Ex.1007, 1-2. Therefore, ITRI teaches “*receiving the SI change indication.*” Ex.1003, ¶116.

ITRI also describes that, via the MIB, the UEs receive scheduling information indicating the frequency resources of the CORESET (*i.e.*, control resource set) that carries RMSI:

The UE receives RMSI scheduling information, including the time and frequency resources in which RMSI is available to UEs

- RMSI scheduling information: [x] bits
 - CORESET(s) information: [x] bits
 - Simplified information of CORESET(s) compared to CORESET(s) information for UE-specific configuration is considered
 - E.g., Time/frequency resource configuration of CORESET(s)

Ex.1007, 1 (annotated); Ex.1003, ¶117.

Using this frequency information for obtaining RMSI (*i.e.*, SIB1), and in response to a “**SI change notification** ... UE can identify the change of SIB1 upon the notification. **The UE acquires the latest SIB1.**” Ex.1007, 2. Therefore, “*in response to receiving the SI change indication,*” ITRI teaches that the UE will get “*an SI update.*” Ex.1007, 2; Ex.1003, ¶118

To the extent ITRI does not provide details regarding “*switching ... BWP[s]*” (*i.e.*, switching frequencies) for the SI update, such techniques were well known to a POSITA, as taught by Jeon and Liao. Ex.1003, ¶119.

Second, Jeon teaches details on how the initially active BWP and the currently active BWP are utilized to provide SI update paging messages and RMSI. Ex.1010, ¶¶0290, 0297; Ex.1011, ¶00174, 185. For example, Jeon explains that the “initial active DL BWP” is “defined” as the location for RMSI. Ex.1010, ¶0376 (“An initial active DL BWP may be defined as frequency location and bandwidth of RMSI CORESET and numerology of RMSI.”), ¶0297; Ex.1011, ¶00185, 271.

Jeon further teaches that a UE may “switch” to the initial active DL BWP to receive RMSI:

[A]n initial DL BWP may comprise a control channel for RMSI, OSI, and/or paging. The wireless device may switch a BWP to monitor such a control channel.

Ex.1010, ¶0299; Ex.1011, ¶00189.

In addition, a “base station may configure [a search space] within a BWP” such as a currently active BWP. Ex.1010, ¶0290; Ex.1011, ¶00174. This search space is provided “as an alternative to [the search space carrying RMSI] for certain information.” Ex.1010, ¶0290; Ex.1011, ¶00174. For instance, “**paging control may be transmitted**” on the search space of a currently active BWP. Ex.1010, ¶0290; Ex.1011, ¶00174. One such paging control message that can be sent in the currently active BWP is “**paging control for a system information update.**” Ex.1010, ¶0297; Ex.1011, ¶¶00185.

Therefore, Jeon teaches configuring SI update pages on an active BWP so that the UE does not have to monitor the initial BWP for such pages and RMSI. *See* Ex.1010, ¶¶0290, 0297; Ex.1011, ¶00174, 185; Ex.1003, ¶¶120-122 (citing Ex.1012, Fig.1). In view of these teachings, a POSITA would have understood a UE could monitor an active BWP for SI update paging, and upon receiving an SI update page, switch to the initial BWP for RMSI. Ex.1003, ¶122. To the extent

Jeon does not explicitly teach a UE switching BWPs specifically in response to a SI update paging message, these details are taught by Liao. Ex.1003, ¶122.

Third, Liao teaches that a UE may switch BWPs based on a variety of signaling techniques: “BWP switch can be based [on] two or more combined methods including a higher-layer signaling, such as the RRC-layer signaling or a MAC CE; a physical-layer signaling, such as the DL control information (DCI).” Ex.1008, 7:43-47; Ex.1009, 24-25.

Liao explains that the BWP switch signaling can be a “**broadcast** and/or multi-cast message includ[ing] ... **paging control for system information update**.” Ex.1008, 7:44-51; Ex.1009, 24-25. Therefore, Liao teaches that a UE switches BWPs in response to a broadcasted SI update paging message (“*in response to receiving the SI change indication, switching from the currently active BWP*”); and Jeon explains that the switch is from a currently active BWP carrying SI updates to the initial active BWP, which is defined as the BWP that carries RMSI. Ex.1003, ¶123 (citing Ex.1014, 68; Ex.1012, Fig.1).

Therefore, Jeon and Liao together teach that, in response to an SI update paging message, the UE switches from a currently active BWP to an initial active BWP for the updated RMSI (“*in response to receiving the SI change indication, switching from the currently active BWP to an initial active BWP for an SI update*”). Ex.1008, 7:41-53; Ex.1009, 24-25; Ex.1010, ¶¶0276, 0290, 0297;

Ex.1011, ¶¶00154-155, 174, 185; Ex.1003, ¶124. Indeed, Liao explains that “the UE can switch its active BWP ... for the monitoring of broadcast message, such as SI” if “the current active BWP for the UE does not include” a search space carrying SI (i.e., RMSI). Ex.1008, 8:49-53; Ex.1009, 26.

A POSITA would have found it obvious to combine the teachings of Jeon and Liao with ITRI’s 5G system “*for an SI update*” at least for the reasons described at Sections X.C.3 and X.C.5. Ex.1003, ¶124. For instance, the resulting combination beneficially allows the UE to monitor pages on the currently active BWP “instead of switching to the BWP containing” RMSI. Ex.1003, ¶124 (quoting Ex.1010, ¶0290). Indeed, combining Liao’s teachings with ITRI-Jeon would have been obvious because Jeon already explains that a UE can “switch a BWP” to receive “a control channel for RMSI.” Ex.1010, ¶0299; Ex.1011, ¶00189.

Thus, ITRI teaches a UE receiving an SI update notification via paging message and frequency scheduling information for RMSI. Jeon teaches configuring a currently active BWP carrying SI update paging, an initial active BWP carrying RMSI, and a UE switching BWPs to obtain RMSI. Ex.1007, 1-2; Ex.1010, ¶¶0276, 0290, 0297, 0299; Ex.1011, ¶¶00154-155, 174, 185, 189. Further, Liao teaches a UE switching BWPs in response to a broadcasted SI update paging message. Ex.1008, 7:41-53, 8:50-53; Ex.1009, 24-26. These references describe known techniques for SI update in the context of multiple BWPs and render

obvious “in response to receiving the SI change indication, switching from the currently active BWP to an initial active BWP for an SI update.” Ex.1003, ¶125

[1.3] receiving remaining minimum SI (RMSI) via the initial active BWP during a next modification period that immediately follows the modification period,

ITRI teaches that, in response to a “SI change notification ... The UE **acquires the latest SIB1.**” Ex.1007, 2. Fig.1 below illustrates a UE receiving “SI change notification in a modification period and **acquir[ing] the updated SIB in the next modification period.**” Ex.1007, Fig.1; Ex.1003, ¶126.

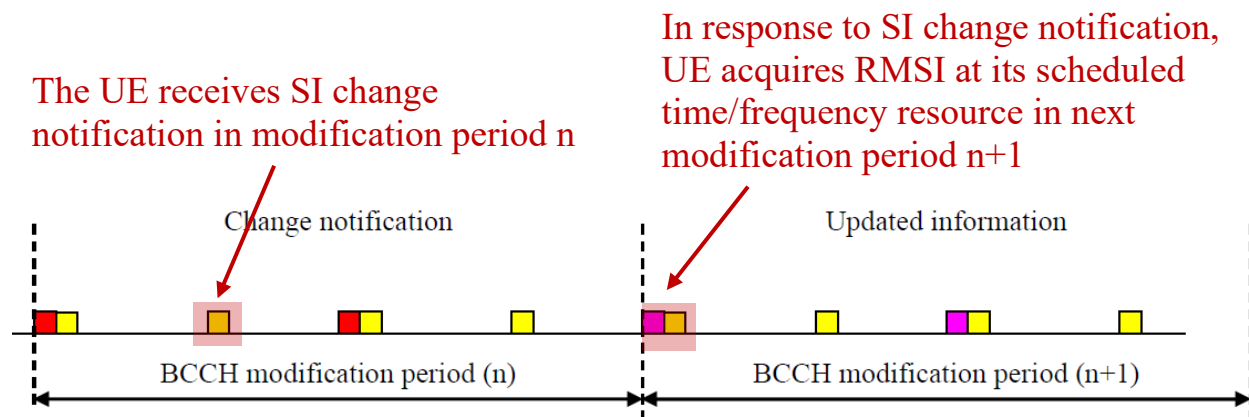


Figure 1. Change of system Information

Ex.1007, Fig.1 (annotated); Ex.1003, ¶126.

ITRI further explains that the UE receives the RMSI/SIB1 according to “RMSI scheduling information” including “frequency resource configuration” of where RMSI is scheduled. Ex.1007, 1. To the extent ITRI does not provide details regarding in which BWP the RMSI is received in, Jeon teaches it was well known to receive RMSI in the “initial active BWP.” Ex.1003, ¶127.

Specifically, as described above at [1.2], Jeon teaches that a UE will “switch” to the initial active DL BWP for RMSI because the initial active DL BWP is “defined” as the BWP that contains RMSI. Ex.1010, ¶¶299, 0376; Ex.1011, ¶¶00189, 271. Therefore, in view of Jeon’s teachings, a POSITA would have found it obvious that a UE in ITRI’s system would receive the updated SIB1 in an “*initial active BWP*.” It would have been obvious to combine the teachings of Jeon with ITRI’s system at least for the reasons described at Section X.C.5. Ex.1003, ¶128.

Thus, ITRI teaches receiving RMSI in the next modification period following the modification period in which an SI update paging message is received, and Jeon teaches receiving RMSI in an initial active BWP, which render obvious “*receiving remaining minimum SI (RMSI) via the initial active BWP during a next modification period that immediately follows the modification period*.” Ex.1003, ¶129.

[1.4] wherein the RMSI includes information associated with changed system information blocks (SIBs);

ITRI teaches that, having received the SIB1 (*i.e.*, “*RMSI*”), the “UE may **check the scheduling information carried in the latest SIB1 for the validity of the other stored SIBs.**” Ex.1007, 2. Then, “[i]f the scheduling information is different from the stored scheduling information, **the UE can identify the**

changed SIBs and acquire the updated SIBs accordingly” Ex.1007, 2; Ex.1003, ¶130. For example, the SIB1 can include “value tag” information for SIBs, and “[i]f the value tag/area information associated a SIB is different from the stored one, UE then identifies the changed SIB(s).” Ex.1007, 2; Ex.1003, ¶130.

Thus, ITRI teaches that the SIB1 (*i.e.*, RMSI) includes scheduling information for identifying the changed SIBs, which renders obvious “*wherein the RMSI includes information associated with changed system information blocks (SIBs).*” Ex.1003, ¶131.

[1.5] determining which of the changed SIBs is required to be updated for the UE according to the received RMSI; and

As discussed at [1.4], ITRI teaches that the UE checks “scheduling information carried in the latest SIB1.” Ex.1007, 2. And “[i]f the scheduling information is different from the stored scheduling information, **the UE can identify the changed SIBs and acquire the updated SIBs accordingly.**” Ex.1007, 2.

For example, the SIB1 can indicate for each of the SIBs a “value tag”—which can be a numerical value that changes each time an SIB is updated. Ex.1007, 2; Ex.1003, ¶132. Then, “[i]f the value tag/area information associated a SIB is different from the stored one, UE then identifies the changed SIB(s).” Ex.1007, 2. ITRI further explains that it was agreed at a 5G working group meeting to

broadcast an “index/identifier in minimum SI to **enable the UE to avoid re-acquisition of already stored SI-block(s)/SI messages(s).**” Ex.1007, 1; Ex.1003, ¶132. ITRI further explains, the “**UE is able to re-acquire only the SIBs which are updated.**” Ex.1007, 3.

Therefore, ITRI teaches “the UE can identify the changed SIBs and acquire the updated SIBs accordingly”—such that the UE determines that all changed SIBs need to be acquired and then acquires those SIBs. Ex.1007, 2. ITRI further explains that the “value tag associated with the concerned SIB may help UE to **determine whether or not to re-acquire the update[d] SIB** in the next modification period.” Ex.1007, 2. A POSITA would thus understand ITRI’s technique to include “*determining which of the changed SIBs is required to be updated.*” Ex.1007, 2; Ex.1003, ¶133.

Indeed, it was well known in the art and obvious to a POSITA that, in both LTE (4G) as well as 5G system discussed in ITRI, each UE can determine which of the changed SIBs require updating based on that UE’s capabilities or services used. *See* Ex.1003, ¶134 (citing Ex.1015, 1 (“**[B]oth types of SI [*i.e.* Minimum SI and Other SI] require the UE who are interested in the information** getting the notification before the system information really changes”)); Ex.1017, ¶0009 (describing various SIBs the “UE needs to acquire” in idle, inactive, and connected states)).

Thus, ITRI teaches the UE identifying which SIB(s) are different based on value tags and acquiring the updated SIBs, which renders obvious “*determining which of the changed SIBs is required to be updated for the UE according to the received RMSI.*” Ex.1003, ¶135.

[1.6] receiving content of the required changed SIBs based on the determination.

As discussed above at [1.4] and [1.5], ITRI teaches that, after acquiring the latest SIB1 (RMSI), “the UE can identify the changed SIBs and **acquire the updated SIBs accordingly.**” Ex.1007, 2. For example, “[i]f the value tag/area information associated [with] a SIB is different from the stored one, **UE then identifies the changed SIB(s) and acquires the latest SIBs** from gNB accordingly.” Ex.1007, 2.

Fig.1 annotated below illustrates the UE receiving the updated SIB1 to determine which updated SIB(s) to acquire, based on value tags, and then receiving the updated SIB(s). Ex.1007, Fig.1, 2-3; Ex.1003, ¶136.

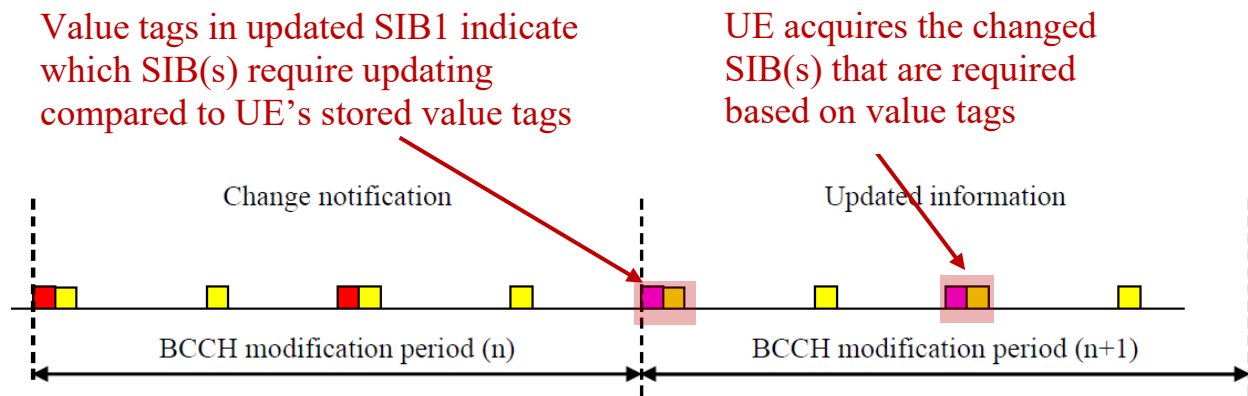


Figure 1. Change of system Information

Ex.1007, Fig.1 (annotated); Ex.1003, ¶136.

Thus, ITRI teaches the UE acquiring updated SIB(s) based on determining which SIB(s) have changed by comparing value tags in SIB1 to the UE's stored value tags, which renders obvious *“receiving content of the required changed SIBs based on the determination.”* Ex.1003, ¶137.

7. Claim 2

[2.0] The method of claim 1, wherein the currently active BWP is switched to the initial active BWP automatically on the end of the modification period.

As discussed above at [1.2], ITRI in view of Liao and Jeon teach a UE switching from an active BWP to an initial active BWP to receive an RMSI update in the next modification period. Ex.1003, ¶137 (citing Ex.1007, 1; Ex.1008, 7:41-53; Ex.1009, 24-25; Ex.1010, ¶¶0290, 0297).

ITRI explains that the “UE may receive multiple SI change notification in a modification period and acquire the updated SIB in the next modification period.”

Ex.1007, 2; *see also* Ex. 1007, 3 (“[i]f the notification is not SIB-specific, the UE should acquire the latest SIB1.”). ITRI illustrates in Fig.1 below that a UE can receive updated SI “in the next modification period” (i.e., $n+1$). Ex.1007, 2, Fig.1; Ex.1003, ¶138.

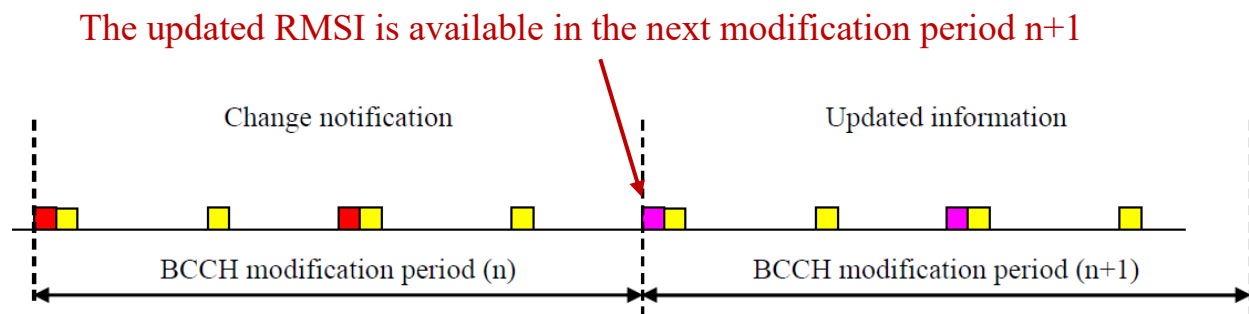


Figure 1. Change of system Information

Ex.1007, Fig.1 (annotated); Ex.1003, ¶138.

To the extent ITRI does not provide details regarding “is switched to the initial active BWPing ... BWP[s]” (i.e., switching frequencies) for the SI update, such techniques were well known to a POSITA, as taught by Jeon and Liao. Ex.1003, ¶119. Therefore, the prior art describes a UE that switches to an initial BWP to obtain updated RMSI in response to an SI update paging message (*see* Ex.1008, 7:41-53, 8:50-53; Ex.1009, 24-26; Ex.1010, ¶¶0290, 0297, 0276; Ex.1011, ¶¶00154-155, 174, 185), where the updated RMSI is available in the next modification period (Ex.1007, Fig.1, 2). Ex.1003, ¶139. It thus would have been obvious to a POSITA that, in the system of ITRI in view of Liao and Jeon, the UE would switch to the initial BWP on the end of the current modification period to

receive the updated RMSI. Ex.1003, ¶139.

This technique would have been obvious because the UE is able to obtain the updated RMSI as soon as it is available: at the beginning of the next modification period. Ex.1003, ¶140. Waiting until the end of the modification period to switch BWPs also would have advantageously allowed the connected UE to continue receiving UE-specific data or control information, using a greater bandwidth, on the currently active BWP. Ex.1003, ¶140. Further, it would have been obvious for the UE to switch to the initial BWP autonomously or “*automatically*” as a UE autonomously switching BWPs was known in the art. Ex.1003, ¶140 (citing Ex.1010, ¶0293 (describing a UE may “autonomously switch to a default BWP”); Ex.1011, ¶00301 (same)).

Thus, ITRI teaches obtaining updated RMSI in the next modification period, which in view of Liao’s and Jeon’s teachings of switching to an initial BWP to obtain updated RMSI in response to an SI update notification, renders obvious “*wherein the currently active BWP is switched to the initial active BWP automatically on the end of the modification period.*” Ex.1003, ¶141.

8. Claim 4

[4.0] *The method of claim 1, wherein the currently active BWP is switched to the initial active BWP in response to receiving downlink control information (DCI).*³

As discussed above at [1.2], Liao teaches that a UE may switch BWPs based on a variety of signaling techniques: “BWP switch can be based two or more combined methods including a higher-layer signaling, such as the RRC-layer signaling or a MAC CE; **a physical-layer signaling, such as the DL control information (DCI).**” Ex.1008, 7:43-47; Ex.1009, 24-25.

Thus, Jeon teaches a UE that can switch from an active BWP to an initial BWP, and Liao teaches that the switch is in response to downlink control information such as a SI update paging broadcast, which in view of ITRI’s system renders obvious “*wherein the currently active BWP is switched to the initial active BWP in response to receiving downlink control information (DCI).*” Ex.1003, ¶¶142-143.

³ The ’238 patent specification provides an example where a broadcasted paging message is an example downlink control information (DCI) message. Ex.1001, 4:11-15 (“[T]he UE receives indications about SI modifications and/or PWS notifications using Short Message transmitted with P-RNTI over downlink control information (DCI).”).

9. Claim 5

[5.0] The method of claim 1, further comprising: completing the SI update of the required changed SIBs within the next modification period in response to receiving the content of the required changed SIBs.

As discussed above at [1.6], ITRI teaches “UE may receive multiple SI change notification in a modification period and acquire the updated SIB in the next modification period.” Ex.1007, 2. For instance, “the UE should acquire the latest SIB1”. Ex.1007, 1. Using the value tags included in the latest SIB1, “the UE can identify the changed SIBs and acquire the updated SIBs accordingly.” Ex.1007, 2.; Ex.1003, ¶144.

Fig.1 annotated below illustrates the UE receiving the updated SIB1 to determine which updated SIB(s) to acquire, based on value tags, and then receiving the updated SIB(s) in the next modification period. Ex.1007, Fig.1, 2-3; Ex.1003, ¶145.

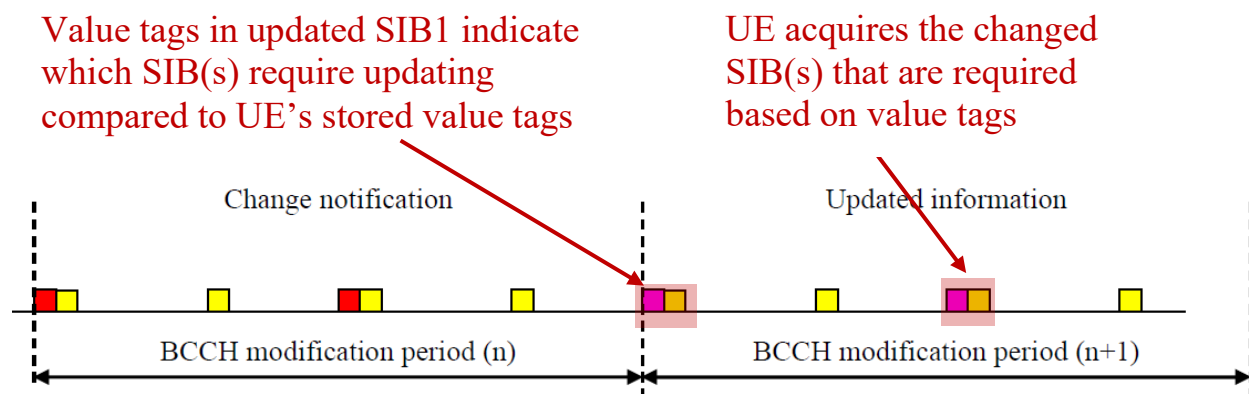


Figure 1. Change of system Information

Ex.1007, Fig.1 (annotated); Ex.1003, ¶145.

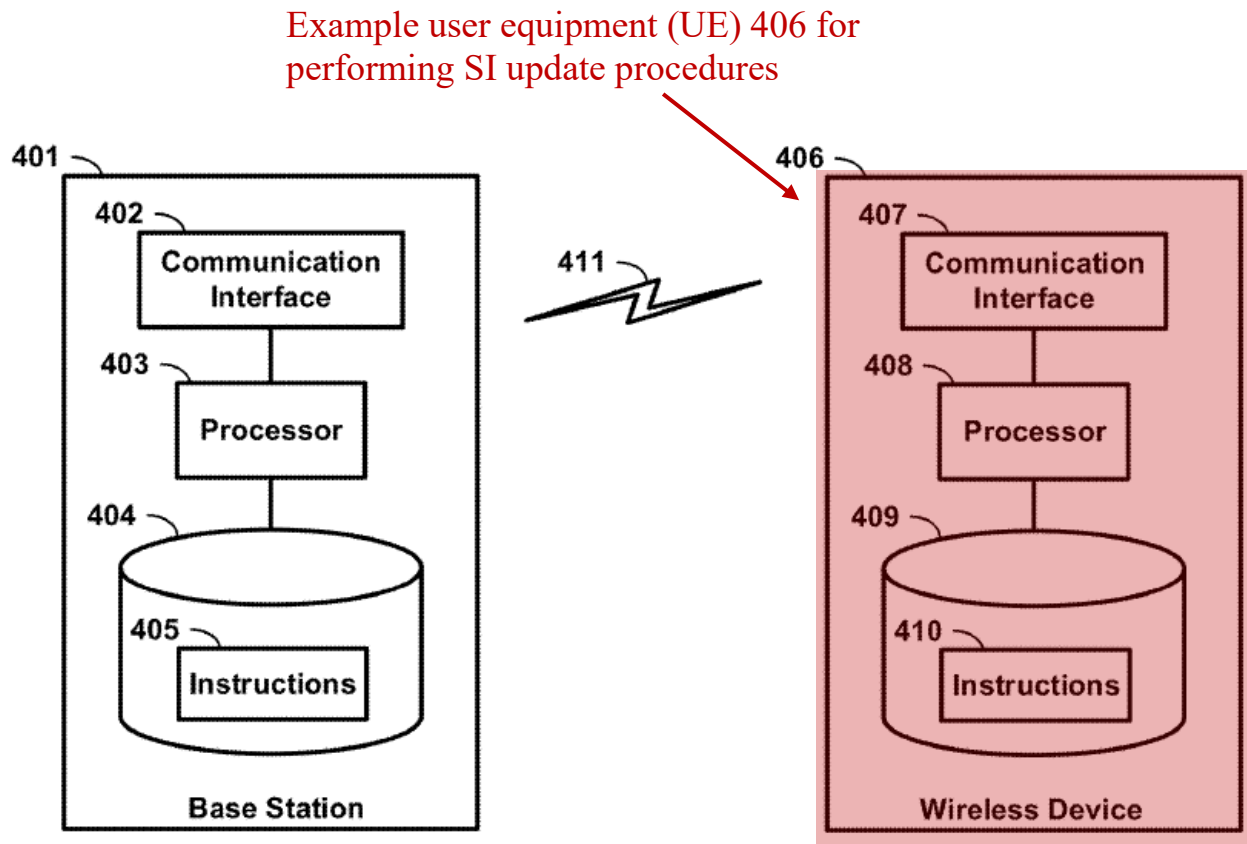
A POSITA would have understood that, because ITRI teaches the UE receiving the updated SIB(s) in the next modification period, it would have been obvious for the UE to “*complet[e] the SI update of the required changed SIBs within the next modification period*” by immediately using the newly acquired updated SIB(s). Ex.1003, ¶146. Indeed, it would have been advantageous and predictable for the UE to use the newly acquired updated SIB(s) as soon as they are acquired (*i.e.*, in the next modification period) so that the UE is using up-to-date system information to avoid a connection or network error due to using incorrect and outdated SIB(s). Ex.1003, ¶146.

Thus, ITRI teaches the UE acquiring updated SI in the next modification period, including SIB1 and any updated SIB(s) based on value tags, which renders obvious, “*completing the SI update of the required changed SIBs within the next modification period in response to receiving the content of the required changed SIBs.*” Ex.1003, ¶147.

10. Claim 11

[11.0] *A user equipment (UE) for wireless communication, comprising:*

Jeon describes a “UE user equipment” for wireless communication using BWPs. Ex.1010, ¶¶0132, 0276. Fig.4 of Jeon below illustrates an example UE. Ex.1010, Fig.4, ¶0146; Ex.1011, Fig.4, ¶¶0021, 31, 154-155; Ex.1003, ¶148.



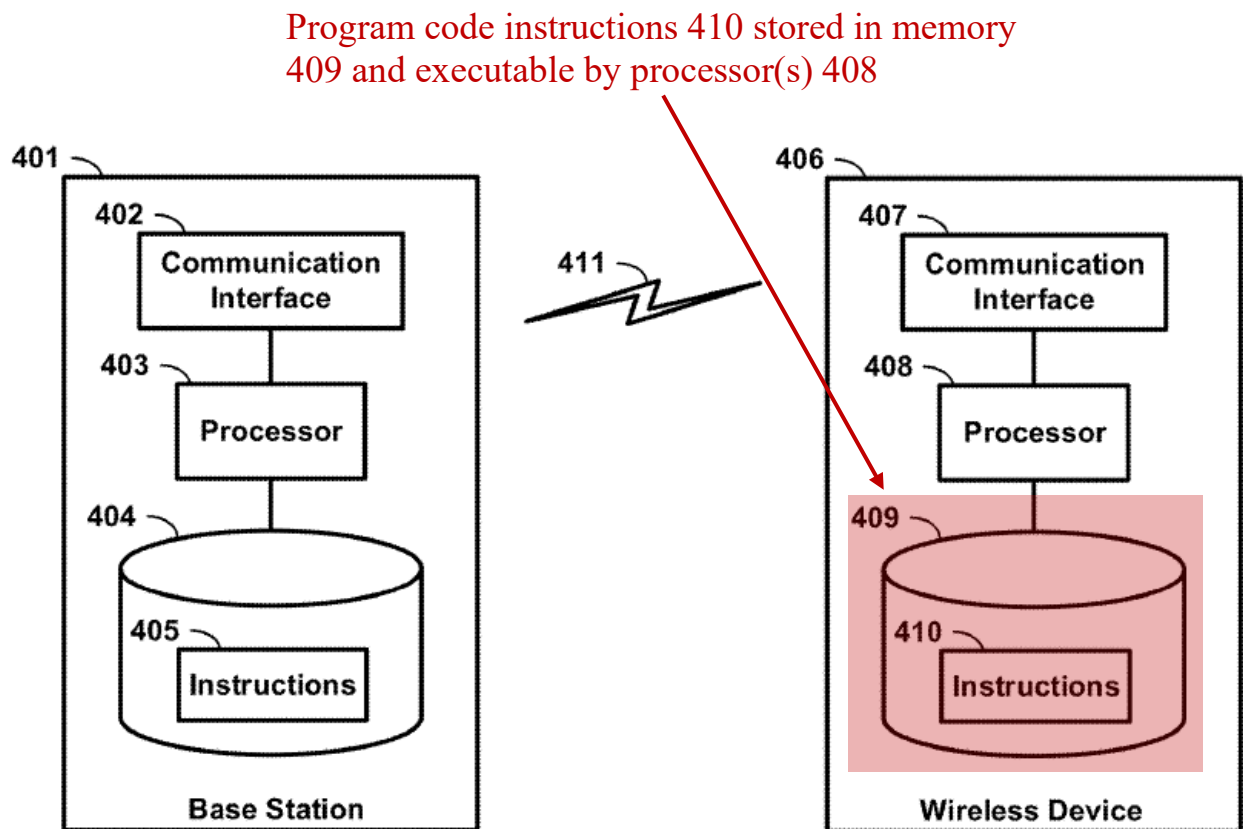
Ex.1010, Fig.4 (annotated); Ex.1011, Fig.4; Ex.1003, ¶148.

ITRI and Liao further describe details for an example UE configured for SI update procedures, as discussed above. Ex.1007, 1-3; Ex.1008, 7:41-53; Ex.1009, 24-25; Ex.1003, ¶149. A POSITA would have found it obvious to implement Jeon's example UE and SI update techniques in ITRI's system for SI update at least for the reasons provided above at Section X.C.5.

Thus, Jeon's UE, in view of ITRI's and Liao's techniques for SI update, render obvious "[a] user equipment (UE) for wireless communication." Ex.1003, ¶150.

[11.1] *a non-transitory machine-readable medium storing computer-executable instructions;*

Jeon teaches an example UE that includes “at least one set of **program code instructions 410 stored in non-transitory memory 409 and executable** by the one or more processors 408.” Ex.1010, ¶0146; Ex.1011, ¶0031. Fig. 4 below illustrates program code instructions 410 stored in non-transitory memory 409, which is coupled to a processor(s) 408. Ex.1003, ¶151.



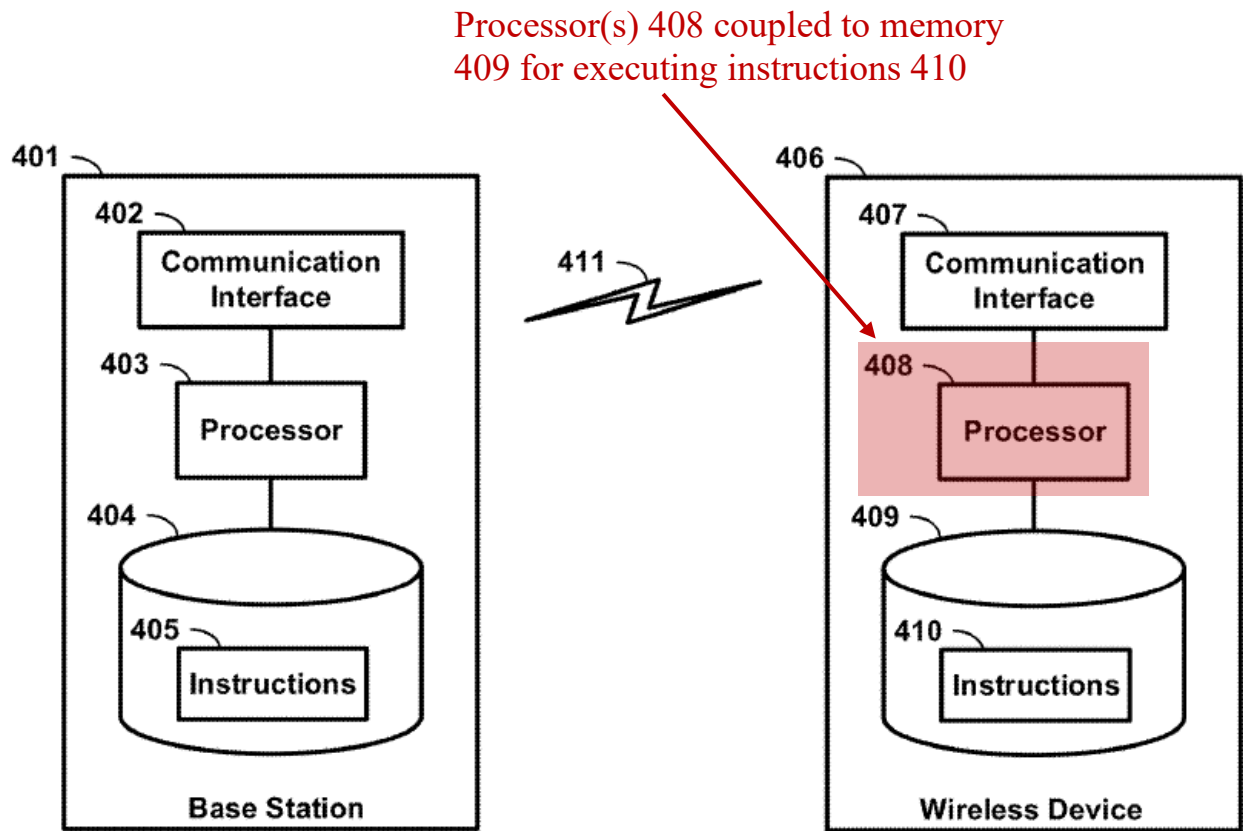
Ex.1010, Fig.4 (annotated); Ex.1011, Fig.4; Ex.1003, ¶151.

Thus, Jeon’s UE including program code instructions stored in non-transitory memory instructions and executable by processors, in view of ITRI’s

system and Liao's techniques for SI update, render obvious "*a non-transitory machine-readable medium storing computer-executable instructions.*" Ex.1003, ¶152.

[11.2] *a processor coupled to the non-transitory computer-readable medium, and configured to execute the computer-executable instructions to cause the UE of a connected state to perform operations comprising:*

As discussed at [11.1], Jeon teaches a UE including "at least one set of program code instructions 410 stored in **non-transitory memory 409 and executable by the one or more processors 408.**" Ex.1010, ¶0146; Ex.1011, ¶0031. Fig. 4 below illustrates program code instructions 410 stored in non-transitory memory 409, which is coupled to a processor(s) 408 for causing the UE to perform operations such as SI update procedures. Ex.1010, Fig.4, ¶¶0146, 0297; Ex.1011, Fig.4, ¶¶0031, 00185; Ex.1003, ¶153.



Ex.1010, Fig.4 (annotated); Ex.1011, Fig.4; Ex.1003, ¶153.

Thus, Jeon's connected-mode UE including program code instructions stored in non-transitory memory instructions and executable by processors, in view of ITRI's system and Liao's techniques for SI update, render obvious "*a processor coupled to the non-transitory computer-readable medium, and configured to execute the computer-executable instructions to cause the UE of a connected state to perform operations comprising.*" Ex.1003, ¶154.

[11.3] receiving a system information (SI) change indication broadcasted by a paging via a currently active bandwidth part (BWP) during a modification period;

ITRI in view of Liao and Jeon render obvious this element; see element [1.1] above. Ex.1003, ¶155.

[11.4] *in response to receiving the SI change indication, switching from currently active BWP to an initial active BWP for an SI update; and*

ITRI in view of Liao and Jeon render obvious this element; see element [1.2] above. Ex.1003, ¶156.

[11.5] *receiving remaining minimum SI (RMSI) via the initial active BWP during a next modification period that immediately follows the modification period,*

ITRI in view of Liao and Jeon render obvious this element; see element [1.3] above. Ex.1003, ¶157.

[11.6] *wherein the RMSI includes information associated with changed system information block (SIB);*

ITRI in view of Liao and Jeon render obvious this element; see element [1.4] above. Ex.1003, ¶158.

[11.7] *determining which of the changed SIBs is required to be updated for the UE according to the received RMSI; and*

ITRI in view of Liao and Jeon render obvious this element; see element [1.5] above. Ex.1003, ¶159.

[11.8] *receiving content of the required changed SIBs based on the determination.*

ITRI in view of Liao and Jeon render obvious this element; see element [1.6] above. Ex.1003, ¶160.

11. Claim 12

[12.0] *The UE of claim 11, wherein the currently active BWP is switched to the initial active BWP automatically on the end of the modification period.*

ITRI in view of Liao and Jeon render obvious this element; see claims 11 and 2 above. Ex.1003, ¶161.

12. Claim 14

[14.0] *The UE of claim 11, wherein the currently active BWP is switched to the initial active BWP in response to receiving downlink control information (DCI).*

ITRI in view of Liao and Jeon render obvious this element; see claims 11 and 4 above. Ex.1003, ¶162.

13. Claim 15

[15.0] *The UE of claim 11, wherein the processor is further configured to execute the computer-executable instructions to cause the UE of a connected state to perform operations comprising: completing the SI update of the required changed SIBs within the next modification period in response to receiving the content of the required changed SIBs.*

ITRI in view of Liao and Jeon render obvious this element; see claims 11 and 5 above. Ex.1003, ¶163.

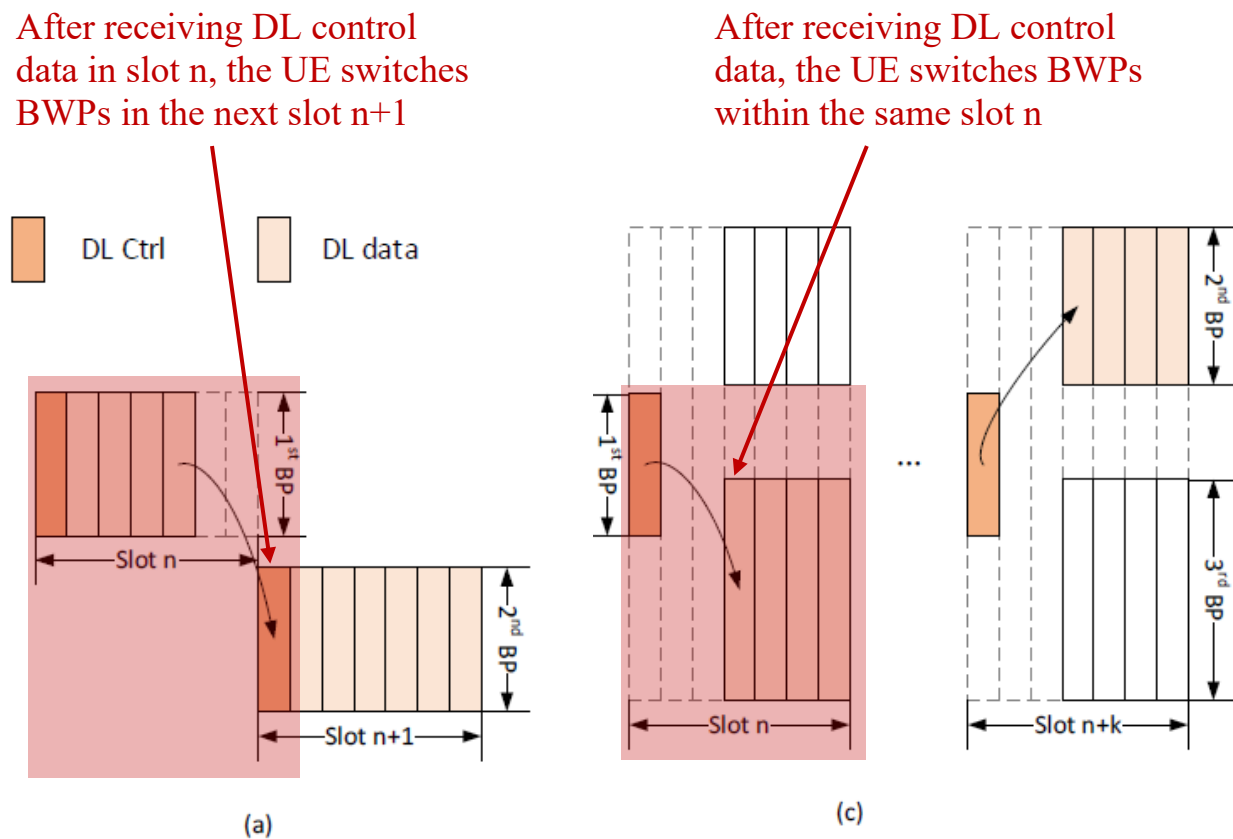
D. Ground 2: Claims 3 and 13 are obvious under 35 U.S.C. § 103 over ITRI in view of Liao, Jeon, and Huawei

1. Summary of Huawei

Huawei describes configuring the “frequency location” and “control for RMSI” delivery to UEs in 5G. Ex.1012, 5-6. Huawei also describes techniques for “bandwidth part switching.” Ex.1012, 1-2.

Huawei teaches that “the UE receives both DL control information and DL data within the 1st bandwidth part during slot n while the UE switches to the 2nd bandwidth part during slot n+1.” Ex.1012, 2. As another example, the UE switches to the 2nd bandwidth part during the same slot n. Ex.1012, 2; Ex.1003, ¶¶164-165.

Fig.2 below illustrates examples of receiving downlink control data in a first BWP and switching to a second BWP in the next time slot (Fig.2(a), left) or in the same time slot (Fig.2(c), right). Ex.1012, Fig.2, 2; Ex.1003, ¶166.



Ex.1012, Fig.2(a) and (c) (annotated); Ex.1003, ¶166.

2. Reasons to Combine ITRI, Liao, and Jeon with Huawei

A POSITA would have been motivated to combine the teachings of ITRI, Liao, and Jeon with Huawei. Ex.1003, ¶167. Before the priority date of the '238 patent, it would have been obvious, beneficial, and predictable to utilize Huawei's teachings regarding immediate BWP switching in combination with the system of ITRI, Liao, and Jeon—for example, to immediately switch BWPs upon receiving an SI change notification. Ex.1003, ¶167.

As an initial matter, one of ordinary skill in the art when considering the teachings of ITRI, Liao, and Jeon would have naturally considered the teachings of Huawei as they are all analogous prior art pertaining to the same field of endeavor as the '238 patent, namely, cellular telecommunications. *See* Ex.1012, 1. Specifically, like the '238 patent, Huawei describes RMSI acquisition in the context of 5G. Ex.1012, 5-6. Huawei is also reasonably pertinent to the particular problem of the '238 patent, such as SI acquisition procedures and BWP switching to reduce network load in 5G. *See, e.g.*, Ex.1012, 5-6; Ex.1003, ¶168.

As described above at Section X.C.5, a POSITA would have found it obvious to combine ITRI's system with Liao's and Jeon's technique for SI update. A POSITA also would have found it beneficial and predictable to include Huawei's teachings regarding BWP switching in the combined system. Ex.1012, Fig.2, 1-2; Ex.1003, ¶169. For instance, Huawei teaches it was well known that,

after receiving control information in a first BWP, to switch to a second BWP immediately, *i.e.*, in the same or next time slot. Ex.1012, Fig.2, 1-2. It would have been obvious to apply this technique to the system of ITRI, Liao, and Jeon, so that in the resulting combination, the UE switches to the initial BWP immediately after (*e.g.*, next or same time slot) receiving an SI change notification. Ex.1003, ¶169.

Indeed, this combination would have been obvious because it was specifically contemplated in other prior art references as well. Ex.1003, ¶170. For instance, the Dawid reference explains: “**the BWP switch is made because of a SI update required ...** such as a next modification period or **immediately.**” Ex.1023, 16:16-19.

One of ordinary skill in the art would have been specifically motivated to incorporate Huawei’s technique of immediate BWP switching into the system of ITRI-Liao-Jeon because doing so would address a well-known issue pertaining to SI update: SI update may be needed immediately. Ex.1003, ¶¶171. Huawei’s technique solves the problem when a UE immediately needs the SI update (by immediately switching to the initial BWP for updated RMSI) in order to continue service on the network. Ex.1003, ¶171 (citing Exs.1024-1026). Therefore, a POSITA would have been motivated to incorporate Huawei’s teachings into ITRI’s system for SI update.

This combination would have been predictable with an expectation of

success because, as was common in the art, “the UE may immediately perform SI reacquisition (SI refresh) when recognizing the occurrence of the SI update.”

Ex.1003, ¶172 (quoting Ex.1024, ¶0422). A POSITA would have also found the combination predictable and would have had a reasonable expectation of success, as the combination does not change the intended functionality of any of Liao’s or Jeon’s techniques. Further, any modification to ITRI’s teachings so that the UE switches BWPs immediately (as opposed to waiting until the end of the current modification period) is consistent with ITRI’s SI update technique—as the UE would still switch BWPs prior to the next modification period and thus would be ready to update its SI in the next modification period, as taught by ITRI. Ex.1003, ¶172.

A POSITA also would have expected success as Huawei’s BWP switching technique was *specifically intended* to be implemented in response to the UE receiving downlink information or DCI instructing the UE to switch BWPs. Ex.1012, 5-6. Therefore, it would have been obvious to apply Huawei’s technique in ITRI’s system. Ex.1003, ¶173-174 (citing Ex.1007, 1-2; Ex.1012, 1-2, 5-6).

3. Claim 3

[3.0] *The method of claim 1, wherein the currently active BWP is switched to the initial active BWP immediately upon receiving the SI change indication.*

First, ITRI in view of Liao and Jeon renders obvious the method of claim 1,

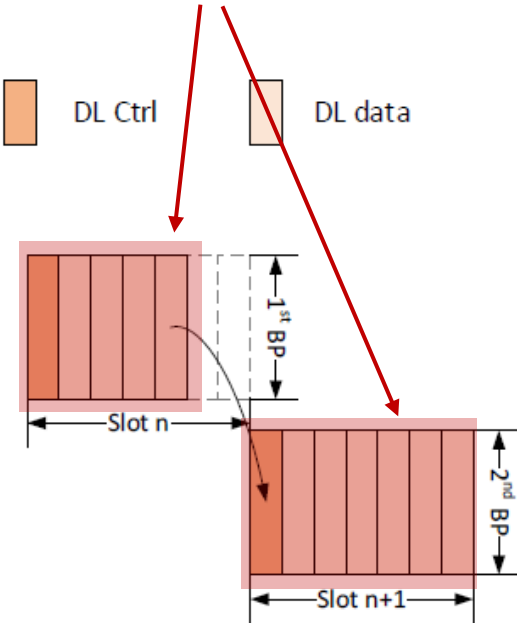
as discussed above. Ex.1003, ¶175.

Second, Huawei teaches techniques for “bandwidth part switching.”

Ex.1012, 1. For instance, Huawei teaches it was known in the art to receive data on one BWP and switch to another BWP in the next time slot or even the same time slot. Ex.1012, Fig.2, 2; Ex.1003, ¶176.

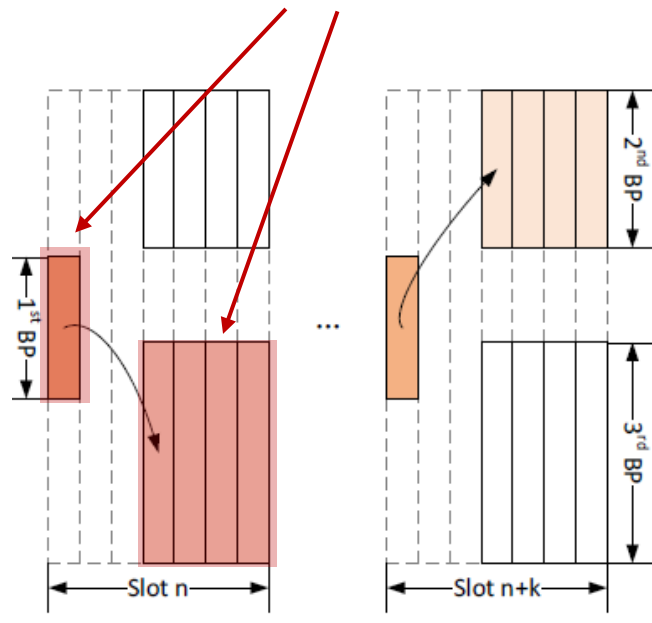
Fig.2 below illustrates these examples where a UE switches BWPs “*immediately*” after receiving downlink control information, including in the next slot (Fig.2(a)) or within the same time slot (Fig.2(c)). Ex.1012, Fig.2, 2, 4; Ex.1003, ¶177.

After receiving DL control data in slot n, the UE switches BWPs in the next slot n+1



(a)

After receiving DL control data, the UE switches BWPs within the same slot n



(c)

Ex.1012, Fig.2(a) and (c) (annotated); Ex.1003, ¶177.

A POSITA would have found it obvious to combine the teachings of Huawei with ITRI, Liao, and Jeon at least for the reasons provided above at Section IX.D.2. Ex.1003, ¶179. For instance, a UE can advantageously switch to the initial BWP in the next or same time slot, in response to receiving an SI change notification, because the UE may immediately need an SI update in order to continue receiving service. Ex.1003, ¶178.

Thus, Huawei teaches a UE switching BWPs in the same or next time slot in response to receiving downlink control information, which, in view of ITRI, Liao,

and Jeon, renders obvious claim 3. Ex.1003, ¶179.

4. Claim 13

[13.0] *The UE of claim 11, wherein the currently active BWP is switched to the initial active BWP immediately upon receiving the SI change indication.*

ITRI in view of Liao, Jeon, and Huawei render obvious this element; see claims 11 and 3 above. Ex.1003, ¶180.

XI. PTAB DISCRETION SHOULD NOT PRECLUDE INSTITUTION

A. The *Fintiv* Factors Favor Institution Under § 314

The six *Fintiv* factors considered for § 314 denial strongly favor institution. *See Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential); *Memorandum: Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation* (June 21, 2022) (applying *Fintiv* factors). Not only is the parallel WDTX case at an early stage, but both Apple and Togail have asked to transfer the case to a California district. Ex.1029, 3. The likely transfer of the district court case will vacate the current scheduling order.

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 (PTAB June 16, 2020) (informative) (“*Sand*”). Thus, this factor is neutral on discretionary denial.

2. Parallel proceeding trial date

According to the current WDTX Scheduling Order, the *Markman* Hearing will not take place until March 30, 2023; fact discovery will not open in earnest until March 31, 2023⁴; and trial will not commence until April 1, 2024. Ex.1028, 2-3. This Markman hearing and trial schedule, however, is likely to be vacated because Apple and Togail agree that the case should be transferred to a California district. Ex.1029, 1. Apple filed a motion seeking transfer to NDCA, and Togail opposes only to the extent that it believes the case should instead be transferred to SDCA. Ex.1029, 1-3. This uncertainty weighs in favor of institution. *See Sand* at 8-10, 14.

Moreover, even if the case was not transferred, the projected WDTX trial date based on median time-to-trial statistics is not until September of 2024, the same month the Board is expected to issue its Final Written Decision. *See* Ex.1030, 37 (showing median time-to-trial of 28.9 months). This factor heavily favors institution.

⁴ Apple and Togail conducted venue discovery in connection with a motion to transfer and agreed to limited third-party discovery prior to the start of fact discovery on March 31, 2023. Full fact discovery between the parties has not commenced

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; full fact discovery has not yet commenced and will not close until October 18, 2023; and expert discovery has not commenced and will not close until December 21, 2023. Ex.1028, 2-3; *see PEAG LLC v. Varta Microbattery GmbH*, IPR2020-01214, Paper 8 at 17 (Jan. 6, 2021). This lack of investment favors institution.

Since Petitioner learned which claims were being asserted in October 2022, Petitioner has worked expeditiously to file this petition. Ex.1028, 1. 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

Because the co-pending litigation is in its early stages, Petitioner’s invalidity positions have not yet been fully developed—only the preliminary invalidity contentions have been served. Final invalidity contentions are not due until May 25, 2023. Ex.1028, 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—true of most Petitioners in IPR proceedings, making this factor neutral. *See HP Inc. v. Slingshot Printing LLC*, IPR2020-01084, Paper 13 at 9 (PTAB Jan. 14, 2021).

6. Other circumstances

The prior art presented in this Petition renders the Challenged Claims unpatentable as obvious. The merits of Petitioner’s arguments are compelling. For instance, Petitioner presents two grounds that invalidate each of the Challenged Claims.

Additionally, Patent Owner has engaged in a campaign of asserting the ’238 patent against multiple defendants across the industry, including Samsung Electronics Co., Motorola Mobility LLC, Google LLC, TCL Technologies, and TCT Mobile. *See infra* Section XII.B. There is thus a strong public interest in the Office adjudicating the validity of the claims here. This factor weighs against discretionary denial.

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

B. The *Fintiv* Framework Should Be Overturned

The *Fintiv* framework should be overturned at least because it was adopted without notice-and-comment rulemaking. *See Apple Inc. v. Vidal*, No. 2022-1249,

slip op. (Fed. Cir. Mar. 13, 2023).

C. The *Advanced Bionics* Test Favors Institution Under § 325(d)

Denial under § 325(d) is not warranted because the challenges presented in this petition are neither cumulative nor redundant to the prosecution of the '238 patent. The Examiner did not consider any of the references relied upon in this petition. Moreover, the challenges in this petition are non-cumulative because the art herein teaches the claim elements the Examiner deemed allowable. *See* Ex.1002, 163, 187; Ex.1008, 7:41-53, 8:50-53; Ex.1009, 24-26.

The merits of Petitioner's arguments are compelling. Petitioner presents two grounds that invalidate each of the Challenged Claims. Further, the limitation added via amendment prior to allowance is already discussed in the Background section of the '238 patent specification.

XII. CONCLUSION

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

Respectfully submitted,

Dated: March 22, 2023
HAYNES AND BOONE, LLP
2323 Victory Avenue, Suite 700
Dallas, Texas 75219
Customer No. 27683

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

XIII. 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 Apple Inc.

B. Related Matters

Pursuant to 37 C.F.R. § 42.8(b)(2), to the best knowledge of the Petitioner, the '238 patent is or was involved in the following cases:

Case Heading	Number	Court	Filed
<i>Togail Technologies Ltd. v. Apple Inc.</i>	6-22-cv-00326	WDTX	Mar. 28, 2022
<i>Togail Technologies Ltd. v. Samsung Electronics Co., Ltd. et al.</i>	6-22-cv-00328	WDTX	Mar. 28, 2022
<i>Togail Technologies Ltd. v. Motorola Mobility LLC</i>	1-22-cv-02176	NDIL	Apr. 26, 2022
<i>Togail Technologies Ltd. v. Google LLC</i>	6-22-cv-00327	WDTX	Mar. 28, 2022
<i>Togail Technologies Ltd. v. TCL Technology Group Corp., TCT Mobile Intl. Ltd., et al.</i>	2-23-cv-00039	EDTX	Feb. 1, 2023

C. Lead and Back-up Counsel and Service Information

Lead Counsel

Scott T. Jarratt
HAYNES AND BOONE, LLP
2323 Victory Ave. Suite 700
Dallas, TX 75219

Phone: (972) 739-8663
Fax: (214) 200-0853
scott.jarratt.ipr@haynesboone.com
USPTO Reg. No. 70,297

Back-up Counsel

Andrew S. Ehmke
HAYNES AND BOONE, LLP
2323 Victory Ave. Suite 700
Dallas, TX 75219

Phone: (214) 651-5116
Fax: (214) 200-0853
andy.ehmke.ipr@haynesboone.com
USPTO Reg. No. 50,271

Samuel Drezdzon
HAYNES AND BOONE, LLP
2323 Victory Ave. Suite 700
Dallas, TX 75219

Phone: (972) 739-6918
Fax: (214) 200-0853
samuel.drezdzon.ipr@haynesboone.com
USPTO Reg. No. 67,085

Clint Wilkins
HAYNES AND BOONE, LLP
2323 Victory Ave. Suite 700
Dallas, TX 75219

Phone: (972) 739-6927
Fax: (214) 200-0853
clint.wilkins.ipr@haynesboone.com
USPTO Reg. No. 62,448

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 13,940. 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: March 22, 2023

/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 March 22, 2023

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. 10,743,238; Petitioner's Exhibit List; Exhibits 1001-1033, 1101-1143.

Persons served ScienBiziP, PC
550 South Hope Street
Suite 2825
Los Angeles, CA 90071

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