

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

TOGAIL TECHNOLOGIES LTD.,
Patent Owner.

IPR2023-00721
U.S. Patent No. 10,972,972

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

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PETITIONER’S EXHIBIT LIST

Ex.1001	U.S. Patent No. 10,972,972
Ex.1002	Prosecution History of U.S. Patent No. 10,972,972
Ex.1003	Declaration of Dr. Zhi Ding under 37 C.F.R. § 1.68
Ex.1004	<i>Curriculum Vitae</i> of Dr. Zhi Ding
Ex.1005	U.S. Patent Pub. No. 2020/0288479 to F. Xi <i>et al.</i> (“Xi”)
Ex.1006	U.S. Patent Pub. No. 2019/0261287 to Y. Deenoo <i>et al.</i> (“Deenoo”)
Ex.1007	WIPO Publication WO 2019/219162
Ex.1008	U.S. Provisional App. No. 62/652,805 (“Xi-Provisional”)
Ex.1009	Y. Huang et al., “Multi-Panel MIMO in 5G,” <i>IEEE Comm. Mag.</i> , pp. 56-61, March 2018
Ex.1010	J. Razavilar et al., “Software Radio Architecture with Smart Antennas: A Tutorial on Algorithms and Complexity,” <i>IEEE Journal on Selected Areas in Communication</i> , pp. 662-676, April 1999.
Ex.1011	H. Newton, <i>Newton’s Telecom Dictionary, 26th Expanded and Updated Edition</i> , 2011 (selected pages)
Ex.1012	U.S. Patent No. 9,432,977
Ex.1013	U.S. Patent Pub. No. 2020/0077432
Ex.1014	U.S. Patent Pub. No. 2019/0373667
Ex.1015	WIPO Publication WO 2019/219162
Ex.1016	U.S. Patent No. 11,271,635
Ex.1017	U.S. Provisional App. No. 62/653,824 (Provisional of Ex.1016)
Ex.1018	WDTX case 622-cv-00326, Plaintiff’s Preliminary Infringement Contentions (cover document), served Oct. 3, 2022

Ex.1019	WDTX case 622-cv-00326, Dkt. 33, Scheduling Order, filed Oct. 24, 2022
Ex.1020	WDTX case 622-cv-00326, Dkt. 53, Defendant Apple Sealed Reply in Support of Its Motion to Transfer Venue, filed February 9, 2023
Ex.1021	U.S. District Courts – Case Statistics, obtained at https://www.uscourts.gov/statistics-reports/analysis-reports/federal-court-management-statistics , per Director Vidal, Memorandum, “Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation” at n.4, dated June 21, 2022
Ex.1022	WDTX case 622-cv-00326, Dkt. 49, Defendant Apple Inc.’s Opening Claim Construction Brief, filed Jan. 26, 2023
Ex.1023	WDTX case 622-cv-00326, Dkt. 54, Togail Technologies Ltd.’s Responsive Claim Construction Brief, filed Feb. 16, 2023
Ex.1024	WDTX case 622-cv-00326, Dkt. 55, Defendant Apple Inc.’s Reply Claim Construction Brief, filed March 2, 2023

I. INTRODUCTION

U.S. Patent No. 10,972,972 (the “’972 patent,” Ex.1001) describes a mobile device that performs a comparison between two quantities: a “scheduling offset value” and a “leading time duration.” Ex.1001, 31:25-28. The “scheduling offset value” was a known term of art related to the time offset between a scheduling assignment message received in a control channel and the corresponding data received in a data channel scheduled by the control-channel message. Ex.1001, 8:5-10; Ex.1003, ¶33. The term “leading time duration” appears to be a term specific to the ’972 patent. The ’972 patent defines “leading time duration” as the time required for a mobile station to switch beams after receiving a beam switch command. Ex.1001, 6:23-31, 8:65-9:2; Ex.1003, ¶66.

Exemplary claim 1 was amended during prosecution to add the following limitation to obtain allowance:

determine that the scheduling offset value is invalid, when a time duration indicated by the scheduling offset value is less than a leading time duration indicated by the applied leading time value.

Ex.1002, 183-193. In other words, if a scheduling offset value (the time between a control message and corresponding data) is less than the applied leading time value (the time to switch to a beam for receiving the data message), the device will not have enough time to adjust its receiver to receive the data message, in which case the device may recognize that the scheduling offset is “*invalid*.”

This concept was not new. For example, U.S. Patent Pub. No. 2020/0288479 to F. Xi *et al.* describes the use of an estimated time period (that Xi calls “threshold K”) for a mobile device to switch antenna beams, and also describes comparing the scheduling offset value to the threshold K. Xi recognizes that “[i]f the scheduling offset...is smaller than the threshold K,” a “suitable” beam other than the indicated beam may be used to “avoid loss” of data “scheduled before the threshold K.” Ex.1005, [0109]-[0110]. That is, Xi’s mobile device determines that the scheduling offset value is not usable, or invalid, if it is less than a threshold K, such that the device is not able to switch its antenna array quickly enough to the indicated beam to receive the data message at the time indicated by the scheduling offset. Thus, a “suitable” beam may be used other than the indicated beam. Xi likewise discloses or renders obvious the other limitations of exemplary claim 1.

In light of the analysis presented herein, 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, 2, 8-16, and 22-28 (hereinafter, the “Challenged Claims”) of the ’972 patent.

II. GROUNDS FOR STANDING

Petitioner certifies that the ’972 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. 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 in view of the analysis below.

IV. NOTE

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

V. SUMMARY OF THE '972 PATENT AND RELATED TECHNOLOGY

The '972 patent generally relates to wireless communication devices, such as mobile devices or UEs, that include one or more antenna panels. For example, “[a]s shown in FIG. 1, a wireless communication device 100 includes four antenna panels 102, 104, 106 and 108.” Ex.1001, 7:4-6.

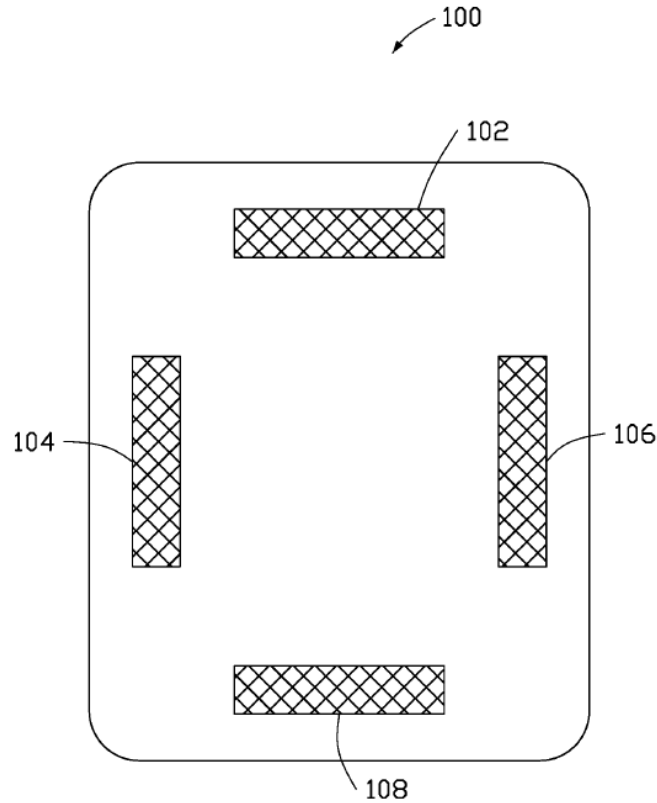


FIG. 1

Ex.1001, Figure 1

Each antenna panel may include a number of physical antennas. Ex.1001, 7:6-11. As was known in the art and explained in the Background section of the '972 patent "a number of antenna panels at the transceiver/receiver can bring extra degrees of freedom to increase the data throughput, beamforming gain and coverage." Ex.1001, 1:25-31; Ex.1003, ¶30.

The '972 patent references beamforming, *see, e.g., id.*, 1:27-31, and beam

switching, *id.*, 6:24-27, concepts that were well understood in the art. For example, beamforming refers to the use of an antenna array to focus and direct energy toward another device in the form of a radio beam. Ex.1003, ¶31 (citing Exs.1010 and 1011). Though an antenna may be in a fixed location, the beam direction is dynamic in space and time so that the antenna pattern may be concentrated in a desired direction, thus increasing the signal energy transmitted (if beamforming is implemented in the transmitter) and/or received (if beamforming is implemented in the receiver) in that direction. Ex.1003, ¶32. The figure below illustrates multi-panel transmission and use of beamforming when multiple panels are implemented in a base station/access point. *Id.*

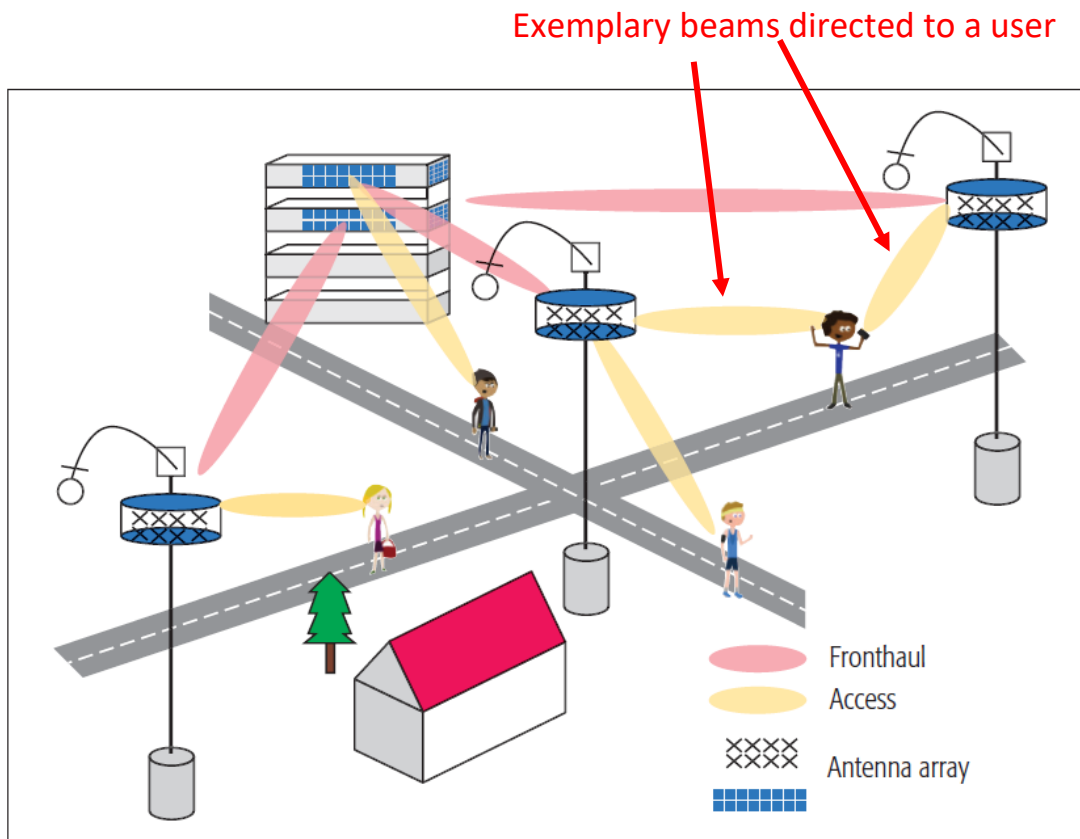


Figure 1. Multi-panel MIMO transmission in 5G

Ex.1009, Figure 1 (annotated in red); Ex.1003, ¶32

The '972 patent relates to a problem concerning scheduling offset values and multi-panel UEs. The term “scheduling offset” or “scheduling offset value” was a term of art known to POSITAs as generally related to the time offset between a scheduling assignment message received in a Physical Downlink Control Channel (PDCCH) and the corresponding Physical Downlink Shared Channel (PDSCH) allocation scheduled by the PDCCH message. Ex.1003, ¶33 (citing Ex.1005); Ex.1001, 8:5-10. In effect, a “scheduling offset” is used by a transmitter to tell a receiver when to expect a data channel transmission. Ex.1003, ¶33.

The '972 patent recognizes that “[i]f the scheduling offset of a DL/UL RSs/channel reception/transmission cannot fulfill the leading time requirement, the UE may not be able to transmit/receive the RSs/channel successfully.” Ex.1001, 9:2-6. In other words, if a scheduling offset value (indicating a time at which a PDSCH message will be transmitted) is less than the appropriate leading time value (reflecting the time it takes a UE having at least one antenna panel to switch to an indicated beam for receiving the PDSCH) the UE will not have enough time to adjust its antenna panel status to receive before the PDSCH message arrives and therefore data may not be received by the UE correctly. In such a case, the '972 states that a UE may recognize “that the scheduling offset is invalid.” Ex.1001, 17:38-42. Ex.1003, ¶¶34-35.

VI. PROSECUTION HISTORY

The application that led to the '972 patent was filed on July 15, 2019, claiming the benefit of U.S. App. No. 62/699,465, filed on July 17, 2018. A non-final rejection was issued on August 28, 2020, in which the original independent claims were rejected, but certain dependent claims were indicated as allowable, including dependent claim 16. Ex.1002, 195-208. In response, Applicant amended claim 1 to include the allowable subject matter of claim 16, and amended other independent claims in a similar manner. Ex.1002, 183-193. For example, the Response states “Applicant has amended independent claim 1 to incorporate the

allowable subject matter in claim 16, and amended independent claim 17 to incorporate the allowable subject matter in claim 32.” Ex.1002, 192. Exemplary claim 1 was amended as follows.

1. (Currently Amended) A wireless communication device comprising:

- a plurality of antenna panels;
- a processor coupled to the plurality of antenna panels and configured to:
 - maintain a plurality of leading time values, ~~wherein~~ the plurality of leading time values ~~indicates~~ indicating a plurality of leading time durations;
 - receive an indicator for antenna panel status information from a base station (BS); ~~[[and]]~~
 - apply one of the plurality of leading time values to switch an antenna panel status of the plurality of antenna panels based on the indicator for antenna panel status information;
 - receive a scheduling offset value from the BS, the scheduling offset value comprising at least one of a K0 parameter for a Downlink (DL) channel and a K2 parameter for an Uplink (UL) channel; and
 - determine that the scheduling offset value is invalid, when a time duration indicated by the scheduling offset value is less than the leading time duration indicated by the selected leading time value.

Ex.1002, 184.

In response, a Notice of Allowance was issued on December 10, 2020. Ex.1002, 163. The Applicant thereafter submitted a response to the Notice of Allowance to “correct formalities.” Ex.1002, 161. Exemplary claim 1 was amended as follows.

1. **(Currently Amended)** A wireless communication device comprising:

- a plurality of antenna panels;
- a processor coupled to the plurality of antenna panels and configured to:
 - maintain a plurality of leading time values, the plurality of leading time values indicating a plurality of leading time durations;
 - receive an indicator for antenna panel status information from a base station (BS);
 - apply one of the plurality of leading time values to switch an antenna panel status of the plurality of antenna panels based on the indicator for antenna panel status information;
 - receive a scheduling offset value from the BS, the scheduling offset value comprising at least one of a K0 parameter for a Downlink (DL) channel and a K2 parameter for an Uplink (UL) channel; and
 - determine that the scheduling offset value is invalid, when a time duration indicated by the scheduling offset value is less than ~~[[the]]a~~ leading time duration indicated by the ~~selected~~ applied leading time value.

Ex.1002, 154. Thereafter, the '972 patent issued on April 6, 2021. Ex.1003,

¶¶36-37.

None of the references used herein as part of any ground was considered during prosecution of the '972 patent.

VII. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art ("POSITA") in the field of the '972 patent, as of the earliest possible priority date of July 17, 2018, would have been someone knowledgeable and familiar with the cellular telecommunications arts that are pertinent to the '972 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 three years of relevant experience in mobile communications or wireless networks, or a Ph.D. degree and one year of

relevant 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 district court for the

¹ The parties have filed claim construction briefs in district court (*see generally* Exs. 1022-1024) but there has been no claim construction decision to date nor is

claim term “*leading time value*,” the dispute is irrelevant for this proceeding because the dispute in the district court involves whether the proposed construction is merely an example found in the specification or a lexicographic definition. *See* Ex.1022, 29; Ex.1023, 22; Ex.1024, 16. But that dispute is not in controversy in light of the prior art relied upon in this instant Petition, which discloses or renders the claim obvious under either scope of the term.

Petitioner submits that, for the purposes of this proceeding, only one term requires an explicit construction, as indicated below. The remaining terms of the challenged claims should be given their plain and ordinary meaning in this proceeding. Ex.1003, ¶38. Petitioner does not concede that any term in the challenged claims meets the statutory requirements of 35 U.S.C. § 112, or that the challenged claims recite patentable subject matter under 35 U.S.C. § 101.

“an indicator for antenna panel status information” (Claims 1 and 15)

Exemplary claim 1 includes the following limitation: “receive an indicator for antenna panel status information from a base station (BS).” Claim 15 includes a similar limitation. The ’972 patent specification describes an indicator for antenna panel status broadly as any implicit or explicit indication of how many, or which,

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).

antenna panels are turned on or off. For example, the '972 patent specification recites:

In some implementations of the present disclosure, the antenna panel status may be used for indicating, explicitly or implicitly, how many, or which, of the antenna panels of the UE are turned on (or active, or able to transmit and receive data), and/or how many, or which, of the antenna panels of the UE are turned off (or inactive, or not able to transmit and receive data).

Ex.1001, 10:4-10.

In addition, the indicator for antenna panel status may be implemented as any implicit/explicit data structure.

Ex.1001, 14:53-55.

These explanations make clear that the indicator for antenna panel status information may be implemented as any implicit or explicit data structure that implicitly or explicitly indicates how many, or which, of the antenna panels of the UE are turned on (or active, or able to transmit and receive data), and/or how many, or which, of the antenna panels of the UE are turned off (or inactive, or not able to transmit and receive data). Accordingly, “*an indicator for antenna panel status information*” is construed as “any implicit or explicit indication of how many, or which, antenna panels are turned on or off.” Ex.1003, ¶¶39-40.

IX. IDENTIFICATION OF HOW THE CLAIMS ARE UNPATENTABLE**A. Challenged Claims**

Petitioner challenges claims 1, 2, 8-16, and 22-28, which includes all claims asserted in the plaintiff's infringement contentions in the co-pending litigation.

B. Statutory Grounds for Challenges

Grounds	Claim(s)	Basis
#1	1, 2, 9-12, 14-16, 23-26, 28	35 U.S.C. § 103 obvious over Xi
#2	8, 13, 22, 27	35 U.S.C. § 103 obvious over Xi in view of Deenoo

The earliest possible priority date of the '972 patent is July 17, 2018, the filing date of the provisional application on which the '972 patent relies. All prior art used herein is prior art as of July 17, 2018.

Xi (Ex.1005) is a U.S. patent publication of a PCT application filed on November 15, 2018, which claims priority to U.S. Provisional App. No. 62/652,805 ("Xi-Provisional," Ex.1008) filed April 4, 2018. The disclosure of Xi on which this IPR relies was effectively filed no later than April 4, 2018, the filing date of the Xi Provisional, rendering it prior art under 35 U.S.C. § 102(a)(2). *See* MPEP § 2154.01(b) ("If the subject matter relied upon is described in the application to which there is a priority or benefit claim, the U.S. patent document is effective as prior art as of the filing date of the earliest such application, regardless

of where filed.”)

To the extent Patent Owner argues that Petitioner is required to establish that at least one claim of Xi is supported by Xi-Provisional under *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1379-80 (Fed. Cir. 2015), this is incorrect because the ’972 patent is an AIA patent and AIA §§ 102(a)(2) and 102(d) do not require such analysis. *See Dynamic Drinkware*, 800 F.3d at 1382 nn.1-2; *see also Apple Inc. v Telefonaktiebolaget LM Ericsson*, IPR2022-00341, Paper 10 at 14-16 (PTAB Sept. 14, 2022) (“Based on the statutory language of AIA 35 U.S.C. §§ 100(i)(1)(B), 102(a)(2), and 102(d)(2), in view of the AIA’s legislative history, official guidance from the USPTO, and the MPEP, we determine—as explicitly stated in the MPEP—that for prior-art determinations under AIA § 102, there is no need to evaluate whether any claim of [a reference] patent document is *actually entitled to priority* or benefit under 35 U.S.C. 119.” (internal quotations omitted, emphasis in original)); MPEP § 2154.01(b); USPTO Examination Guidelines for Implementing the First Inventor To File Provisions of the Leahy-Smith America Invents Act, 78 Fed. Reg. 11059, 11087 (February 14, 2013); *see also* 157 Cong. Rec. 1369-70 (Mar. 8, 2011). Although Petitioner need not show that at least one claim in Xi is supported by Xi-Provisional, Petitioner nonetheless offers such analyses. *See* Ex.1003, Section X.

Additionally, for efficient comparison of the subject matter described in Xi

and Xi-Provisional, Petitioner provides a chart that compares the excerpts and figures in Xi that are cited in the Petition and expert declaration with the corresponding excerpts and figures in Xi-Provisional. *See* Ex.1003, Section IX. And Petitioner provides dual citations to Xi and Xi-Provisional herein.

Thus, Xi-Provisional fully supports the Xi disclosures, so Xi is entitled to an effective filing date of April 4, 2018 and is prior art to the '972 patent's earliest claimed priority date of July 17, 2018.

Deenoo (Ex.1006) is a U.S. national stage application of a PCT application filed on October 27, 2017, rendering it prior art under 35 U.S.C. § 102(a)(2).

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, 9-12, 14, 15, 16, 23-26, and 28 are obvious under 35 U.S.C. § 103 over Xi

1. Summary of Xi

Xi discloses a mobile wireless communication device that it refers to as a

wireless transmit/receive unit (WTRU), such as “WTRUs 102a, 102b, 102c, 102d”
in Figure 1A. Ex.1005, [0021]; Ex.1008, 34.

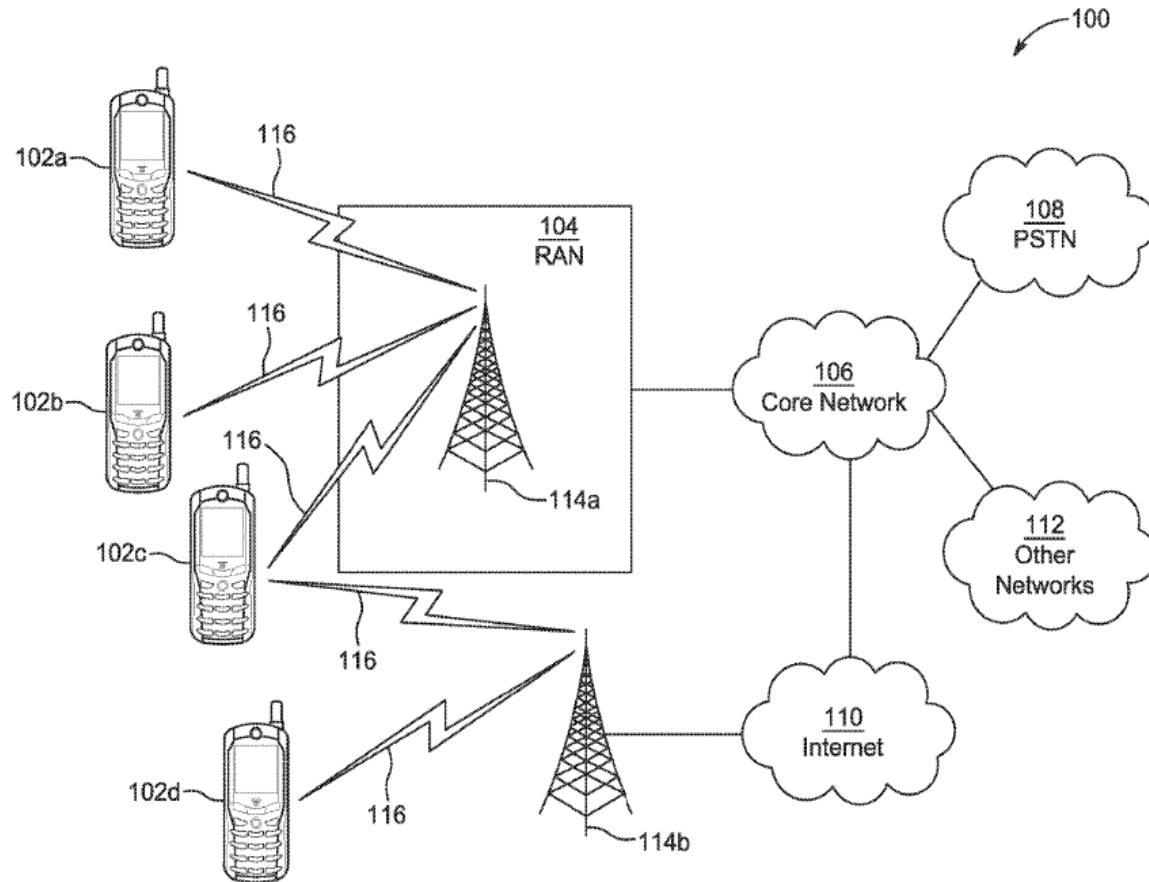


FIG. 1A

Ex.1005, Figure 1A; Ex.1008, Figure 1A

Xi's WTRU includes multiple antenna panels, each having a number of antenna elements. Ex.1005, [0077], Figure 2; Ex.1008, [0073]-[0074], Figure 2.

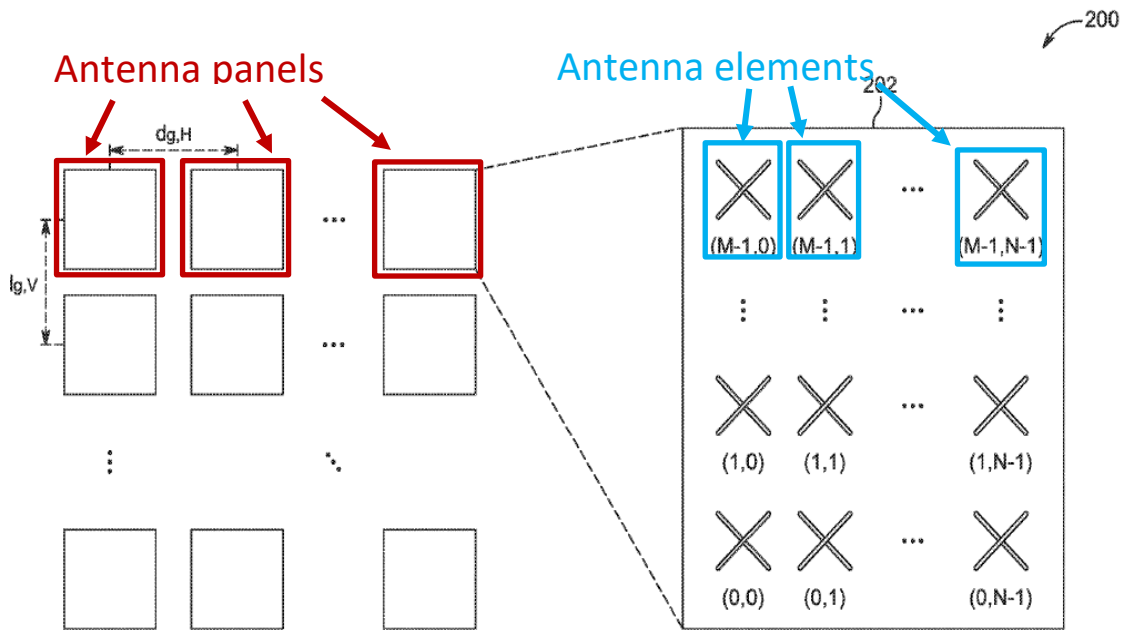


FIG. 2

Ex.1005, Figure 2 (annotated in color); Ex.1008, Figure 2; Ex.1003, ¶46

Xi describes the use of an estimated time period (termed “threshold K”) for a WTRU to switch antenna beams. Ex.1005, [0089] (“Threshold K may also be a value of estimated time duration for a WTRU performing ... beam switching, or the like if a new Rx beam is needed.”); Ex.1008, [0083]-[0084]. Xi also discloses configuring a WTRU with multiple values of the threshold K, and the WTRU may select from one of multiple values, depending on WTRU operation or WTRU state. Ex.1005, [0094] (“The network may also configure a WTRU with several values of threshold K and the WTRU may select or determine a value of threshold K based on network configurations.”); Ex.1008, [0089]; Ex.1005, [0095]; Ex.1008,

[0091].

Xi refers to downlink control information (DCI), which is transmitted on a physical downlink control channel (PDCCH). Ex.1005, [0107]; Ex.1008, 106. The DCI may include a “scheduling offset” used for scheduling data transmissions on the PDSCH. Ex.1005, [0109]; Ex.1008, [0111]. According to Xi, a TCI indicator within the DCI may also indicate the beam used for the PDSCH. Ex.1005, [0083], [0086]; Ex.1008, [0078], [0081]. Thus, in summary, Xi discloses a WTRU having multiple antenna panels that receives DCI from a base station, the DCI including both a beam indication and a scheduling offset indicating a schedule for receiving a subsequent data message on the PDSCH. Ex.1003, ¶¶47-48.

Xi describes comparing the scheduling offset value to the threshold K, which, again, is a time required to switch to the beam indicated by the DCI. For example, Xi notes that if the scheduling offset value (indicating when a PDSCH will be received) is greater than the time required for beam switching (threshold K), then the WTRU is able to use the beam indicated by the DCI. Ex.1005, [0109]; Ex.1008, [0111]. In other words, the WTRU has enough time to switch to the indicated beam before the PDSCH arrives (at a time offset from the DCI indicated by the scheduling offset value). Ex.1003, ¶49.

However, Xi notes that if the scheduling offset value is *less* than the time required for beam switching (threshold K), then the WTRU cannot use the beam

indicated by the DCI to receive the PDSCH in time, so some other rule must be followed. Otherwise, PDSCH information that arrives at the WTRU before the time needed for WTRU beam switching has elapsed may be lost. Ex.1005, [0109]; Ex.1008, [0111]. That is, Xi's WTRU determines that the scheduling offset value is not usable such that the WTRU is unable to switch its beam quickly enough to the indicated beam to satisfy receiving the PDSCH at the time indicated by the scheduling offset. Ex.1003, ¶50.

In the event that a WTRU does not have enough time to switch to the indicated beam, Xi then provides several alternatives for selecting a "suitable Rx beam" that does not involve switching to the beam indicated in the DCI, including the use of a "preconfigured beam" or a "default beam," Ex.1005, [0110], Ex.1008, [0112], or a beam "based on pre-defined rules," Ex.1005, [0113], Ex.1008, 113; Ex.1003, ¶51.

Although Figure 4 of Xi is not included in Xi-Provisional, Figure 4 is useful for tutorial purposes to summarize and illustrate the teachings of Xi above. (Figure 4 is not relied upon in the application of Xi to the Challenged Claims.) As shown below, in the example labeled 410, the scheduling offset of the first slot is greater than "Thres" (or threshold K), so the WTRU has enough time to switch to the "Indicated Beam." However, for the example labeled 402, the scheduling offset for every slot is less than "Thres," so the WTRU does not have enough time to switch

to the “Indicated Beam” and should instead use a “Default Beam” to receive in this example. The example labeled as 406 is an intermediate situation in which the WTRU does not have enough time to switch to the “Indicated Beam” in the first slot (and hence uses a “Default Beam” for that slot) but does have enough time to switch beams to the “Indicated Beam” by the time of the second slot. Ex.1003, ¶52.

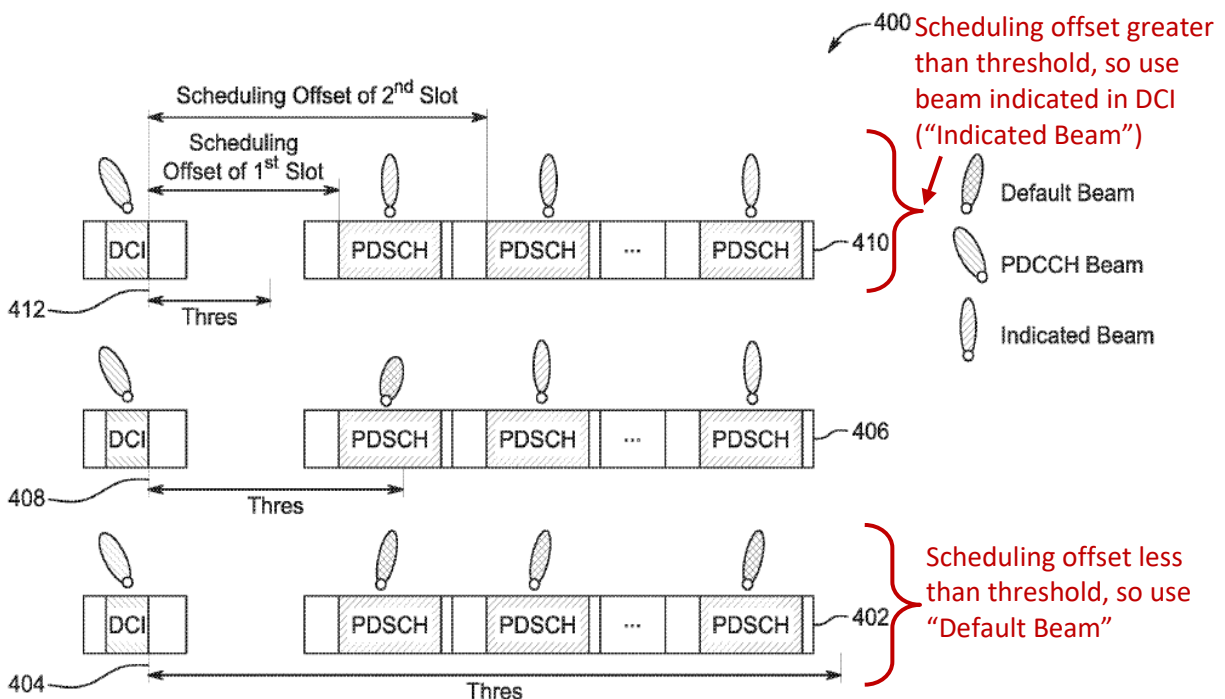


FIG. 4

Ex.1005, Figure 4; Ex.1003, ¶52

2. Claim 1

[1.0] *A wireless communication device comprising:*

Xi discloses a wireless transmit/receive unit (WTRU), which is an example

“wireless communication device,” as claimed. Ex.1005, [0021] (“As shown in FIG. 1A, the communications system 100 may include wireless transmit/receive units (WTRUs) 102a, 102b, 102c, 102d.”); Ex.1008, [0034]; *see also* Ex.1005, Figure 1B, Ex.1008, Figure 1B; Ex.1003, ¶¶53-54.

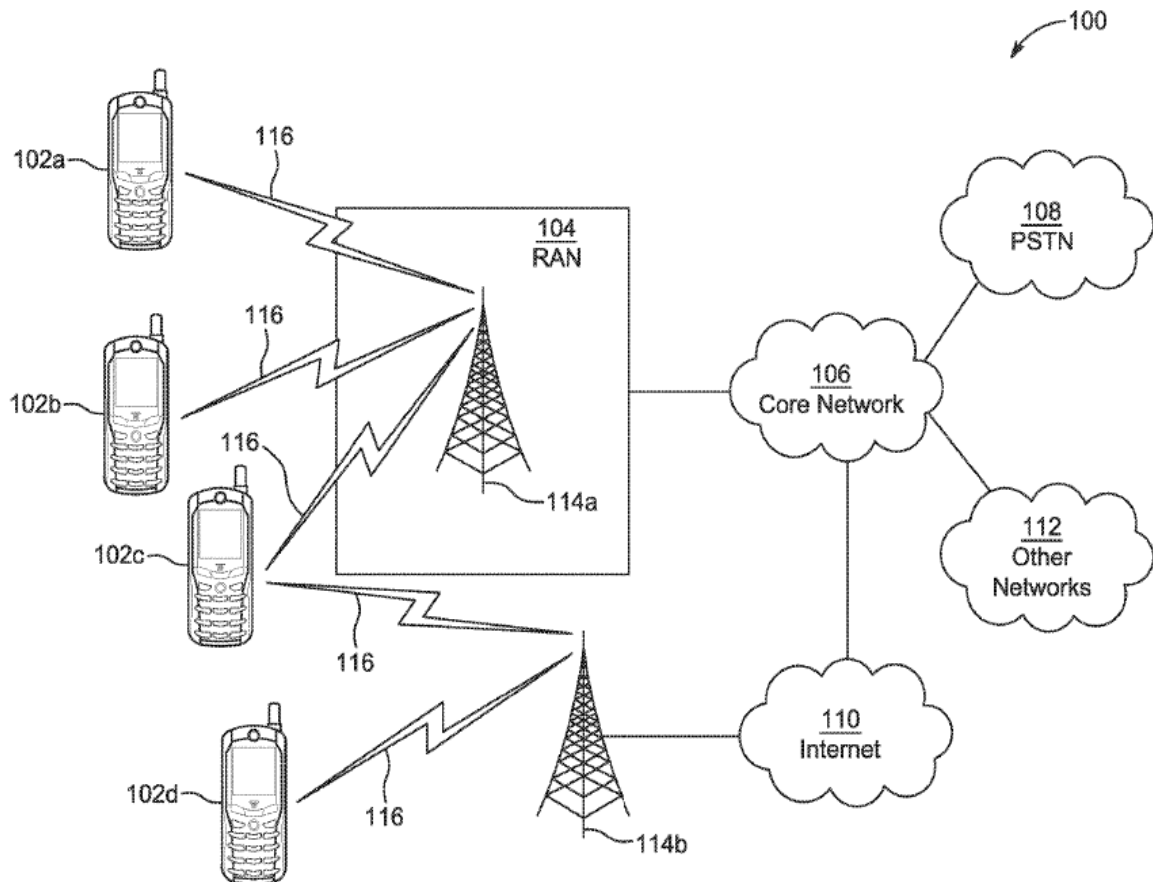


FIG. 1A

Ex.1005, Figure 1A; Ex.1008, Figure 1A

[1.1] a plurality of antenna panels;

Xi’s WTRU includes multiple “antenna panels” (“a plurality of antenna panels”), thereby disclosing claim element [1.1]. Ex.1005, [0077] (“FIG. 2 is diagram of an example of a ... WTRU antenna model 200,” including “Mg

antenna panels per vertical dimension and N_g antenna panels per horizontal dimension.”); Ex.1008, [0073]-[0074]; Ex.1003, ¶55.

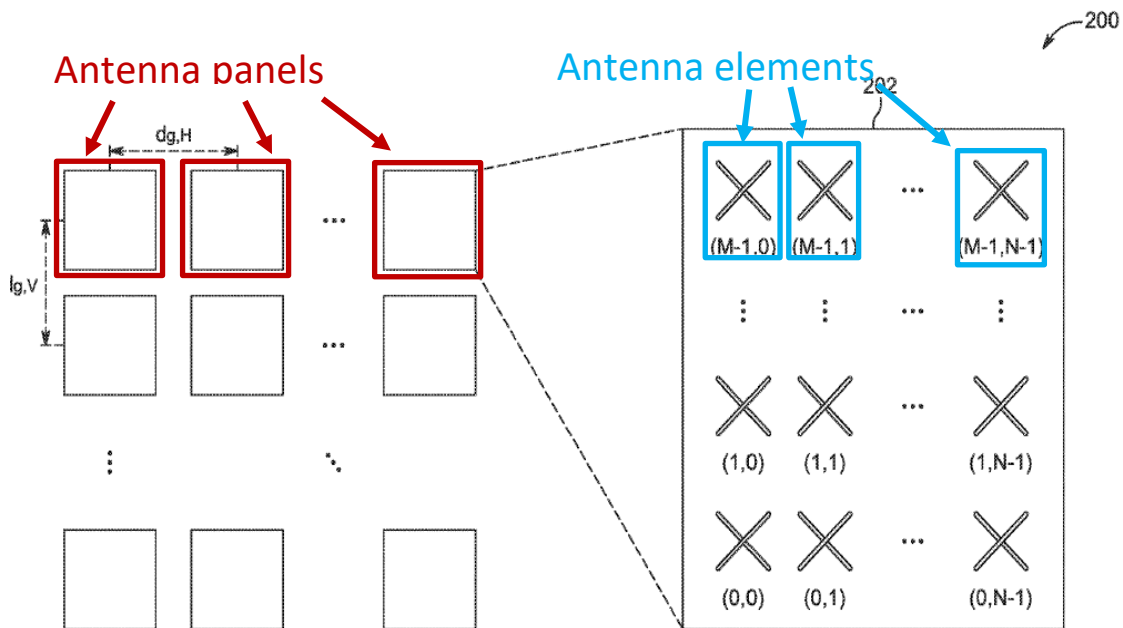


FIG. 2

Ex.1005, Figure 2 (annotated in color); Ex.1008, Figure 2; Ex.1003, ¶55

[1.2] a processor coupled to the plurality of antenna panels and configured to:

Xi discloses a WTRU having a “processor” coupled to a transmit/receive element 122. Ex.1005, [0034], [0035] (“The processor 118 may be coupled to ... the transmit/receive element 122.”); Ex.1008, [0031]-[0032]. The WTRU can include multiple transmit/receive elements 122, representing multiple antennas. Ex.1005, [0037] (“the WTRU 102 may include two or more transmit/receive elements 122 (e.g., multiple antennas) for transmitting and receiving wireless

signals over the air interface”); Ex.1008, [0034]. Thus, Xi discloses a WTRU with a processor (“*a processor*”) that couples to multiple antennas (e.g., multiple transmit/receive elements 122). And, as shown in Figure 2, which illustrates a “WTRU antenna model 200,” the antennas are organized into multiple antenna panels (“*the plurality of antenna panels*”). Thus, Xi’s WTRU processor coupled to multiple antennas, which are organized as multiple antenna panels, discloses or renders obvious “*a processor coupled to the plurality of antenna panels.*” Ex.1003, ¶57.

[1.3] *maintain a plurality of leading time values, the plurality of leading time values indicating a plurality of leading time durations;*

First, Xi discloses the use of an estimated time duration (termed “threshold K”) for switching beams in a WTRU (“*leading time value*”/“*leading time duration*”). Xi recognizes the use of a “threshold K, which may be an estimated time duration that the WTRU needs to finish ... beam switching from a current Rx beam to a new Rx beam, or the like. Threshold K may also be a value of estimated time duration for a WTRU performing ... beam switching, or the like if a new Rx beam is needed.” Ex.1005, [0088]-[0089]; Ex.1008, [0083]-[0084]. Thus, the “threshold K,” an example of which is the estimated time for beam switching if a new receive beam is needed, is a “*leading time value*,” indicating “*a leading time duration.*” Ex.1003, ¶¶58-60.

The ’972 patent defines “*leading time value*,” or “*leading time duration*,” as

the time required to for a mobile station with at least one antenna panel to switch beams after receiving a beam switch command:

The **leading time for beam switching** is, or may reflect, the minimum required time for a UE to set up its antenna panel(s) for providing an indicated RX/TX beam to receive or transmit data. For example, the **leading time for beam switching** may be the time period between the time the UE receives a command that leads to a change(s) in the Rx beam/antenna panel status and the time that the change(s) actually occurs.

Ex.1001, 6:23-31; *see also* 8:65-9:2; Ex.1003, ¶¶66-67.

Second, Xi also discloses that the WTRU maintains multiple values of the threshold K. Ex.1005, [0092] (“[A] WTRU may be configured with one or more values of threshold K.”), [0093], [0094] (“The network may also configure a WTRU with several values of threshold K...”), [0095], [0084]; Ex.1008, [0087]-[0089], [0091], [0079].

Furthermore, Xi explains that the threshold K can depend on the “WTRU processing time for beam switching, ... number of antenna panels equipped and used simultaneously/non-simultaneously, ... or the like.” Ex.1005, [0090]; Ex.1008, [0084]. Thus, a threshold K (a “*leading time value*,” indicating “*a leading time duration*”) depends on the beam switch time and number of antenna panels used in a WTRU, or may more generally depend on a “WTRU operation” or “WTRU state,” such as current antenna configuration/beam usage. In addition,

Tables 2 and 3 of Xi present different values of threshold K, depending on component carrier (CC), subcarrier spacing (SCS), and bandwidth part (BWP) being used in a given geography in the wireless system. Ex.1005, [0097], [0099]; Ex.1008, [0093]. Thus, there are multiple values of beam switching time (threshold K) maintained by the WTRU. Ex.1003, ¶¶61-64.

In summary, Xi discloses a multi-panel WTRU being configured with (thus “*maintain[ing]*”) multiple values of threshold K (“*plurality of leading time values indicating a plurality of leading time durations*”), each of which is an estimated duration of time for performing beam switching, thereby disclosing or rendering obvious “*maintain a plurality of leading time values, the plurality of leading time values indicating a plurality of leading time durations.*” Ex.1003, ¶65.

[1.4] receive an indicator for antenna panel status information from a base station (BS);

Xi discloses downlink control information (DCI) received by a WTRU that includes a Transmission Configuration Indicator (TCI) for scheduling the PDSCH. Ex.1005, [0084] (“[A] present TCI field may be located in the associated DCI for NR-PDSCH scheduling.”); Ex.1008, [0079]. The TCI indicator within the DCI may also **indicate the beam used for the PDSCH**. Ex.1005, [0086] (“**A DL beam indication for NR-PDSCH** may be included in an N-bit TCI field in a DCI.”); [0083]; Ex.1008, [0078], [0081]. Xi’s multi-panel WTRU therefore receives a beam indication from a base station in a TCI indicator. Likewise, the ’972 patent

states that “the indicator for antenna panel status information may be contained in a TCI state ID indicated by the BS.” Ex.1001, 10:64-11:1; Ex.1003, ¶¶69-71.

Xi’s beam indicator (conveyed via a TCI value) is *an indicator for antenna panel status information* because it implicitly indicates or specifies which panel(s) in Xi’s WTRU to utilize. Ex.1003, ¶73. This is because in multi-panel WTRUs, a beam is associated with one or more specific panels, as Dr. Ding explains in his declaration based on extensive evidence. *Id.* (citing *e.g.*, Ex.1016, 9:42-46 (“To build gNB 170 awareness of which panels UE 110 would use to receive certain transmit beams, the UE 110 may provide gNB 170 with beam reports indicating, with panel tag, which panel is used for measuring certain beam management (BM) source RS.”); Ex.1017, [0051]; Ex.1015, Abstract).

And because a beam is associated with a panel, a POSITA would have understood that a TCI beam indicator communicated to a multi-panel WTRU implicitly indicates a particular antenna panel. Ex.1003, ¶74 (citing Ex.1015, Abstract (“Each TCI-state corresponds to a radio beam and also corresponds to an antenna panel.”), [0088] (“A given TCI may lead to a UE using a specific panel for reception.”), [0089] (“The UE can then determine, based on the configuration and active TCI state, which TX/RX panels it is allowed to deactivate/turn off, for instance, for power saving purposes.”), [0120], [0123], 28 (claims 1, 2, and 5)). When a WTRU uses an antenna panel for a beam, the panel is turned on. Since

remaining unused panels are not needed for communication, it would have been understood or obvious to a POSITA that these panels can be turned off. Ex.1003, ¶74 (citing Ex.1007). Accordingly, an indication of a specific beam is an implicit indication of a specific antenna panel or panels in Xi's multi-panel WTRU that is in use and therefore turned on. Xi's beam indicator received from the base station informing the WTRU of which beam to use (turn on) is thus an example of "*an indicator for antenna panel status information*," as the claim term is properly understood ("any implicit or explicit indication of how many, or which, antenna panels are turned on or off"). Ex.1003, ¶74.

Further, the concept of implicit signaling in wireless communications was well known to a POSITA. Implicit signaling generally refers to a linkage between an explicitly signaled quantity and a second quantity such that a receiver that receives or knows the explicitly signaled quantity can determine the second quantity from the explicitly signaled quantity. Ex.1003, ¶75 (citing Exs. 1006 and 1012). In the same way, it would have been obvious that a multi-panel WTRU that receives a beam indication would have implicitly known which panel or panels to use for the indicated beam, particularly since an indicated beam is necessarily generated by antennas in the WTRU's antenna panels. Ex.1003, ¶75.

Thus, Xi's teaching of a WTRU having multiple antenna panels (per the analysis of [1.2] and [1.3]) and Xi's teaching of a WTRU receiving a beam

indication from a base station for receiving (and a scheduling offset for scheduling) a subsequent PDSCH message, discloses or renders obvious “*receive an indicator for antenna panel status information from a base station (BS).*” Ex.1003, ¶76.

[1.5] *apply one of the plurality of leading time values to switch an antenna panel status of the plurality of antenna panels based on the indicator for antenna panel status information;*

Xi renders obvious claim element [1.5] because it teaches that its WTRU selects and applies one of the available values of the threshold K to determine whether to switch to the panel implicitly indicated by the beam indicator (*apply one of the plurality of leading time values to switch an antenna panel status of the plurality of antenna panels*) based on the TCI beam indicator (*based on the indicator for antenna panel status information*). In more detail, Xi teaches a WTRU having multiple antenna panels and that receives a beam indication from a base station for receiving (and, in the same message, a scheduling offset for scheduling) a subsequent PDSCH message. The beam indicator is used (1) to implicitly indicate which antenna panel to use and (2) to determine which threshold K (*leading time value*) to use (because the particular threshold K used is based on which beam is indicated in the beam indicator). Ex.1003, ¶77.

As explained in the analysis of claim element [1.3], Xi discloses that the threshold K (*leading time value*) is selected or determined by a WTRU, Ex.1005, [0092]-[0094], Ex.1008, [0087]-[0089], and the threshold K depends on WTRU

processing time for beam switching and the number of panels equipped and used simultaneously or non-simultaneously, Ex.1005, [0088]-[0090], Ex.1008, [0083]-[0084]. And, as explained in [1.4], Xi teaches that its WTRU receives a beam indication that implicitly indicates which antenna panel to use (*indicator for antenna panel status information*). Ex.1003, ¶78.

In more detail, Xi explains that a WTRU may be configured with multiple values of threshold K (with each threshold indicating a time duration for beam switching), with the values depending on a variety of factors. **“Threshold K may depend on WTRU capability... WTRU capabilities may include ... WTRU processing time for beam switching, ... number of panels equipped and used simultaneously/non-simultaneously, ... or the like.”** Ex.1005, [0090]; Ex.1008, [0084]. As a numerical example, Xi recognizes that the time to implement an indicated beam depends on whether a beam indication indicates whether a different beam is needed or not. Ex.1005, [0104]; Ex.1008, [0103]; Ex.1003, ¶79. In other words, at any given time, the value used for threshold K can depend on the processing time for beam switching and antenna panel usage. Thus, it would have been obvious, based on Xi’s teachings, for a WTRU to apply a different value of threshold K based on the processing time for beam switching if a beam switch involves switching between antenna panels or changing which panels are in use. Ex.1003, ¶79.

Xi teaches that if the scheduling offset value is less than the threshold K (applied “*leading time value*”), then the WTRU cannot use the beam indicated by the DCI, so some other rule must be followed:

If the scheduling offset of a corresponding NR-PDSCH, that may be indicated by the assignment DCI, is smaller than the threshold K, the WTRU may apply a suitable Rx beam from the starting symbol of the scheduled NR-PDSCH. This operation may avoid loss of NR-PDSCH symbols scheduled before the threshold K.

Ex.1005, [0109]; Ex.1008, [0111]. Xi provides several alternatives for selecting a “suitable Rx beam” that do not involve switching to the beam indicated in the DCI, including the use of a “preconfigured beam” or a “default beam,” Ex.1005, [0110]; Ex.1008, [0112], or a beam “based on pre-defined rules,” Ex.1005, [0113]; Ex.1008, [0113]. Thus, in this example, Xi describes applying a threshold K to determine whether to use the beam/panel indicated by the beam indication, and then switching the beam/panel accordingly, thereby rendering obvious claim element [1.5]. Ex.1003, ¶80.

[1.6] receive a scheduling offset value from the BS, the scheduling offset value comprising at least one of a K0 parameter for a Downlink (DL) channel and a K2 parameter for an Uplink (UL) channel; and

As explained in the Summary of Xi (Section IX.C.1), Xi’s DCI message, received from a BS, includes a scheduling offset value (*receiving a scheduling offset value from the BS*) for receiving a PDSCH (*a downlink (DL) channel*), see

Ex.1005, [0107], [0109]; Ex.1008, [0106], [0111], thereby disclosing or rendering obvious claim element [1.6].² For example, Xi recites:

If the scheduling offset of a corresponding NR-PDSCH, that may be indicated by the assignment DCI, is smaller than the threshold K...

Ex.1005, [0109]; Ex.1008, [0111]; Ex.1003, ¶81. (And as explained in [1.4], the DCI used for scheduling can also include a TCI field that indicates the beam used for PDSCH.)

In the '972 specification, the term “K0 parameter” is a generic name given to the scheduling offset value for a downlink channel, such as PDSCH. Ex.1003, ¶82. For example, the '972 Patent uses the term “K0 value” as follows:

On the other hand, the PDSCH transmission may be associated with another scheduling offset also for the normal leading time case (e.g., a K0 value for determining a PDSCH reception offset).

Ex.1001, 17:50-52.

An illustrative example (Example 1-1) will now be provided, where the **scheduling offset value (e.g., K0 value) for PDSCH reception** may

² The '972 Patent defines the expression “at least one of A, B and C” as requiring only one of A, B, or C. Ex.1001, 3:62-65. Thus, only one of “*at least one of a K0 parameter for a Downlink (DL) channel and a K2 parameter for an Uplink (UL) channel*” needs to be disclosed to satisfy the claim element.

be selected based on an indicator for antenna panel status (e.g., contained in a TCI state) from the BS.

Id., 20:67-21:3. Thus, an example of a “K0 parameter” in the ’972 Patent is a scheduling offset value for PDSCH reception, which is what Xi discloses. Ex.1003, ¶82.

Accordingly, Xi’s DCI received from a base station that includes a scheduling offset value for receiving a PDSCH discloses or renders obvious claim element [1.6]. Ex.1003, ¶83.

[1.7] determine that the scheduling offset value is invalid, when a time duration indicated by the scheduling offset value is less than a leading time duration indicated by the applied leading time value.

As also explained in the analysis of claim element [1.5], Xi describes comparing the scheduling offset value (*scheduling offset value*) to the applied threshold K (*a leading time duration indicated by the applied leading time value*). Xi teaches that if the scheduling offset value is less than the time required for beam switching (threshold K), then the WTRU cannot use the beam indicated by the DCI, so some other “suitable Rx beam” may be applied. Ex.1005, [0109]; Ex.1008, [0111]. Otherwise, PDSCH information received before the time needed for beam switching has elapsed may be lost:

If the scheduling offset of a corresponding NR-PDSCH, that may be indicated by the assignment DCI, is smaller than the threshold K, the WTRU may apply a suitable Rx beam from the starting symbol of

the scheduled NR-PDSCH. This operation may avoid loss of NR-PDSCH symbols scheduled before the threshold K.

Id. That is, Xi's WTRU determines that the scheduling offset value indicated in the downlink control information (DCI) is not usable (*invalid*) if it is less than a threshold K, such that the WTRU is not able to switch its beam quickly enough to the indicated beam to receive the PDSCH at the time indicated by the scheduling offset.³ Ex.1003, ¶85.

Unlike the '972 patent specification, which does not specify how a UE copes with this situation beyond determining that a scheduling offset value is "invalid," Ex.1001, 17:38-42, Xi provides several alternatives for selecting a "suitable Rx beam" that does not involve switching to the beam indicated in the DCI, including the use of a "preconfigured beam" or a "default beam," Ex.1005, [0110]; Ex.1008, [0112], or a beam "based on pre-defined rules," Ex.1005, [0113]; Ex.1008, [0113]; Ex.1003, ¶87.

Thus, Xi discloses a WTRU determining that a time duration indicated by the scheduling offset value is less than the threshold K, which is the time required for beam switching to the indicated beam (*when a time duration indicated by the*

³ Otherwise, if the base station had scheduled the data message in the PDSCH using a sufficiently large scheduling offset, the WTRU would have had enough time to switch beams. Ex.1005, [0109]; Ex.1008, [0111]; Ex.1003, ¶86.

scheduling offset value is less than a leading time duration indicated by the applied leading time value). Xi recognizes that if the WTRU tried to abide by the scheduling offset in this situation, information would be lost (the scheduling offset is “*invalid*”). For these reasons, Xi renders obvious claim element [1.7]. Ex.1003, ¶88.

3. Claim 2

The wireless communication device of claim 1, wherein the processor is further configured to:

[2.1] receive a timer from the BS; and

As explained in Xi, a WTRU may use a beam for a given amount of time, indicated by a timer, which is “configured with each spatial QCL assumption,” so that the beam does not need to be indicated for every PDSCH:

A WTRU may use a semi-persistent beam, such as when a Tx or Rx beam for NR-PDSCH changes slowly or infrequently making indication of the beam in every scheduled NR-PDSCH unnecessary. As an example, a spatial QCL assumption or a beam sent to a WTRU at timeslot t1 may be reused by the WTRU to receive a plurality of subsequent scheduled NR-PDSCH allocations until a condition is satisfied. For low overhead, a spatial QCL assumption may be indicated to the WTRU by using DCI or TCI. ... Another condition may be a timer configured with each spatial QCL assumption.

Ex.1005, [0112]; Ex.1008, [0116]. As recited above, the “timer [may be]

configured with each spatial QCL assumption,” and the “spatial QCL assumption

may be indicated to the WTRU using DCI or TCI.” *See also* Ex.1005, [0113]

(discussing receiving “a timer in a DCI”); Ex.1008, [0117]. As discussed extensively herein, DCI and TCI are control information transmitted by a base station (BS) and received by a WTRU. Ex.1003, ¶¶48, 89-90.

Thus, Xi discloses a WTRU (having a processor) receiving a timer via a “DCI or TCI” or other message from a BS, wherein a beam is used until the timer expires, thereby rendering obvious [2.1]. Ex.1003, ¶91.

[2.2] *switch the antenna panel status from a first antenna panel status to a second antenna panel status after the timer expires.*

As discussed in the analysis of claim element [1.4], it would have been understood by or obvious to a POSITA that a beam indication transmitted to Xi’s multi-panel WTRU would have explicitly or implicitly indicated one or more antenna panels to use for generating the antenna beam. Ex.1003, ¶¶72-73, 92. In receiving a PDSCH using a beam indicated by DCI/TCI, Xi’s multi-panel WTRU would have had “*a first antenna panel status.*” Ex.1003, ¶92.

When a timer expires, a “new spatial QCL assumption” may be used to “overwrite the old spatial QCL assumption”:

Another condition may be a timer configured with each spatial QCL assumption. When the timer expires, spatial QCL assumptions may become invalid. A new spatial QCL assumption may also be a condition indicated or configured that may directly overwrite the old spatial QCL assumption.

Ex.1005, [0112]; Ex.1008, [0116]. Xi discloses that the “spatial QCL assumption” is equivalent to indicating a beam:

If the scheduling offset of a corresponding NR-PDSCH, that may be indicated by the scheduling assignment DCI, is equal or bigger than the threshold K, **NR-PDSCH may use the beam or spatial QCL assumption indicated by the N-bit TCI in the assignment DCI.**

Ex.1005, [0109]; Ex.1008, [0111]. As discussed earlier, a beam would have been generated using one or more antenna panels in Xi’s multi-panel WTRU. Ex.1003, ¶¶72-73, 93.

Accordingly, when Xi’s beam is switched after a timer expires, the multi-panel WTRU may switch to a different antenna panel (or set of panels), thereby disclosing or rendering obvious “*switch the antenna panel status from a first antenna panel status to a second antenna panel status after the timer expires.*”

Ex.1003, ¶94.

4. Claim 9

The wireless communication device of claim 1, [9.1] wherein the indicator for antenna panel status information comprises a multiple-bit Information Element (IE), and the processor is further configured to:

As discussed in the analysis of claim element [1.4], an N-bit TCI indicator indicates the beam for a PDSCH to a multi-antenna-panel WTRU. *See, e.g.,* Ex.1005, [0083] (“NR (New Radio/5G) may utilize dynamic beam indication for PDSCH that may need an **N-bit indicator state or TCI state field in the DL-**

related DCI field for PDSCH beam indication.”); Ex.1008, [0078]. Thus, Xi’s

N-bit TCI, with $N > 1$, is an example “*multiple-bit Information Element (IE)*.”

Ex.1003, ¶95-96.

[9.2] *turn on a particular number of the plurality of antenna panels when the multiple-bit IE is set to a particular value.*

As explained in the analysis of [1.4], it would have been understood or obvious that a beam indication (in a “*multiple bit*” TCI, which is “*set to a particular value*” to indicate the beam) transmitted to Xi’s multi-antenna-panel WTRU would have explicitly or implicitly indicated one or more antenna panels to use, or “*turn on,*” in the WTRU for generating the antenna beam, thereby rendering obvious claim element [9.2]. Ex.1003, ¶97.

For example, Xi’s TCI may indicate the beam used for the PDSCH. Ex.1005, [0083], [0086] (“**A DL beam indication for NR-PDSCH may be included in an N-bit TCI field in a DCI.**”); Ex.1008, [0078], [0081]. As further explained in the analysis of claim element [1.4], a POSITA would have understood that a WTRU having multiple antenna panels, such as in Xi, provides many degrees of freedom for beamforming, such as different beam directions and beamforming gains, thereby providing increased coverage, throughput, and reliability, as compared to a WTRU that has/uses only one antenna panel. Ex.1003, ¶¶72, 99.

For example, Xi’s N-bit TCI field may indicate one of 2^N configured

antenna beams, each of which corresponds to one or more antenna panels that are turned on to generate the beam (the unused panels are off). The value (*particular value*) of the TCI field (*multiple-bit IE*) implicitly indicates which antenna panels are turned on and off to generate one of the configured beams, which corresponds to “*turn[ing] on a particular number of the plurality of antenna panels*,” thereby rendering obvious claim element [9.2]. Ex.1003, ¶¶98-100.

5. Claim 10

The wireless communication device of claim 1, [10.1] wherein the indicator for antenna panel status information is contained in a Transmission Configuration Indicator (TCI) state Identity (ID) indicated by the BS.

Xi discloses or renders obvious claim element [10.1]. For example, see the analysis of claim elements [1.4] and [9.2]. For example, as explained in the analysis of [1.4], Xi teaches that its beam indicator is an implicit indication of which antenna panels to turn on because its beams are associated with specific panels, providing an example of “*an indicator for antenna panel status information*,” as the claim term is properly understood (“any implicit or explicit indication of how many, or which, antenna panels are turned on or off”). Ex.1003, ¶102.

Further, Xi discloses that a TCI state may be used to indicate an antenna beam to the WTRU:

NR (New Radio/5G) may utilize dynamic beam indication for PDSCH that may need an **N-bit indicator state or TCI state field in the DL-related DCI field for PDSCH beam indication.**

Ex.1005, [0083]; [0082] (“TCI” stands for “transmission configuration indication”); Ex.1008, [0077], [0078].

A DL beam indication for NR-PDSCH may be included in an N-bit TCI field in a DCI that utilizes a spatial QCL reference to a DL RS...
Ex.1005, [0086]; Ex.1008, [0081]; Ex.1003, ¶103.

Thus, a particular value of Xi’s N-bit TCI state, received from a base station, provides a beam indication for receiving a PDSCH at a multi-antenna-panel WTRU, thereby rendering obvious “*wherein the indicator for antenna panel status information is contained in a Transmission Configuration Indicator (TCI) state Identity (ID) indicated by the BS.*” Ex.1003, ¶104.

6. Claim 11

The wireless communication device of claim 1, [11.1] wherein the plurality of leading time values is one of cell-specific values and cell group-specific values.⁴

In Xi, different cells may use different subcarrier spacings. Xi, [0063]

⁴ The only relevant portion of the ’972 patent specification makes clear that “one of cell specific and cell-group specific values” means that only one of a “cell specific” or “cell-group specific” value is required. Ex.1001, 12:24-28.

(“OFDM subcarrier spacing (SCS) may vary for ... different cells.”). And there may be different thresholds K (“*leading time values*”) for different subcarrier spacings (SCS):

One or more tables may be specified, pre-configured, configured, or the like to determine threshold K or Threshold-Sched-Offset. ... Table 2 and Table 3 are examples of determining or selecting threshold K.

Ex.1005, [0097]; Ex.1008, [0093]; Ex.1003, ¶¶105-106.

TABLE 2

Beam Indication	Units	60 kHz	120 kHz	60 kHz	120 kHz	...
		<u>SCS</u>	<u>SCS</u>	<u>SCS</u>	<u>SCS</u>	
Latency		CC1/BWP1		CC2/BWP2		
Low	Symbols	Value 1	Value 4	Value 7	Value 10	← threshold K values
Latency	or Slots					
Medium	Symbols	Value 2	Value 5	Value 8	Value 11	
Latency	or Slots					
High	Symbols	Value 3	Value 6	Value 9	Value 12	
Latency	or Slots					

Ex.1005, [0097] (annotated in color); Ex.1008, [0093]; Ex.1003, ¶106

Thus, Xi’s disclosure of different thresholds K (“*leading time values*”) for different values of SCS, and SCS varying for different cells, i.e., SCS is cell-specific, renders obvious that the threshold K values are cell-specific, thereby rendering obvious “*the plurality of leading time values is one of cell-specific values and cell group-specific values.*” Ex.1003, ¶107.

7. Claim 12

The wireless communication device of claim 1, wherein the processor is further configured to:

[12.1] switch the antenna panel status from a first antenna panel status to a second antenna panel status in response to receiving the indicator for antenna panel status information; and

See analysis of [1.4] and [1.5], wherein Xi renders obvious “*receive an indicator for antenna panel status information*” and “*apply one of the plurality of leading time values to switch an antenna panel status of the plurality of antenna panels based on the indicator for antenna panel status,*” respectively. As explained in the analysis of [1.4], Xi’s beam indicator (conveyed via a TCI value) is *an indicator for antenna panel status information* because it implicitly indicates which panel(s) in Xi’s WTRU to use. A POSITA would have generally understood that a WTRU having multiple antenna panels, such as in Xi, provides many degrees of freedom for beamforming, thereby providing increased coverage, throughput, and reliability. Ex.1003, ¶¶72, 108. In other words, antenna panels, each consisting of multiple antenna elements, can generate multiple antenna beam patterns per panel for beamforming. *Id.* Thus, a command to switch antenna beams in Xi’s multi-panel WTRU (“*indicator for antenna panel status*”) renders obvious [12.1] because different antenna beams may be provided by different antenna panels. Ex.1003, ¶¶108-109.

[12.2] *automatically switch the antenna panel status from the second antenna panel status to a third antenna panel status without further reception of an indicator for antenna panel status information from the BS.*

As discussed in the analysis of claim 2, after receiving a beam indication (to switch to “*second antenna panel status*”), the beam may be used for a given period of time indicated by a timer. As discussed in the analysis of claim element [2.2], after the timer expires, a new beam (“*third antenna panel status*”) would be used (“*automatically*”), which renders obvious [12.2].

For example, Xi recites:

When the timer expires, spatial QCL assumptions may become invalid. A new spatial QCL assumption may also be **a condition** indicated or **configured** that may directly overwrite the old spatial QCL assumption.

Ex.1005, [0112]; Ex.1008, [0116]. And Xi discloses that the “spatial QCL assumption” is equivalent to indicating a beam. Ex.1005, [0109] (“NR-PDSCH may use the **beam or spatial QCL assumption** indicated by the N-bit TCI in the assignment DCI.”); Ex.1008, [0111]. Thus, a new beam may be “a condition ...configured.” For example, the new beam “may be pre-configured and known to the WTRU in advance.” Ex.1005, [0110]; Ex.1008, [0112]. When a new beam, which is pre-configured, is used, it would have been obvious that switching to a new antenna panel status (“*third antenna panel status*”) is automatic. Thus, Xi discloses or renders obvious claim element [12.2]. Ex.1003, ¶¶110-112.

8. Claim 14

The wireless communication device of claim 1, wherein the processor is further configured to:

[14.1] enable a power saving mode based on whether the wireless communication device operates in a particular Bandwidth Part (BWP),

Xi teaches that a WTRU may be configured to use various BWPs. For example, Xi's WTRU has a "scalable numerology," referring to specific values of communication parameters, such as subcarrier spacing, cells (which are different carriers), and different portions of the wireless spectrum, such as bandwidth part (BWP). Ex.1005, [0063], [0098]-[0099]; Ex.1008, [0060], [0093]; Ex.1003, ¶113. Xi discloses that that "the DL active BWP for a WTRU changes dynamically," and "the UL active BWP for a WTRU changes dynamically," Ex.1005, [0205]; Ex.1008, [0207]-[0208]. For example, Xi's WTRU may use one of two BWPs: BWP1 or BWP2, as illustrated in Tables 2 (reproduced below) and 3. Ex.1005, [0097], [0099]; Ex.1008, [0093].

TABLE 2

Beam Indication Latency	Units	60 kHz	120 kHz	60 kHz	120 kHz
		SCS	SCS	SCS	SCS
		CC1/ <u>BWP1</u>		CC2/ <u>BWP2</u>	
Low	Symbols	Value 1	Value 4	Value 7	Value 10
Latency	or Slots				
Medium	Symbols	Value 2	Value 5	Value 8	Value 11
Latency	or Slots				
High	Symbols	Value 3	Value 6	Value 9	Value 12
Latency	or Slots				

Ex.1005, [0097] (annotated in color); Ex.1008, [0093]; Ex.1003, ¶113

It was well-known to a POSITA that the radio frequency (RF) power consumption in a mobile device, such as Xi's WTRU, is related to the operating bandwidth, as reflected by the width of a BWP. Ex.1003, ¶114. The analog RF and digital receiver front ends, which are controlled by a processor, consume less power for smaller bandwidths. *Id.* Larger operating bandwidths (e.g., BWPs with larger widths) can be used to facilitate higher data rates when needed (at the expense of higher power consumption), and, likewise, smaller operating bandwidths (e.g., BWPs with smaller widths) can be used when a lower data rate is sufficient (with the benefit of lower power consumption). Ex.1003, ¶114 (citing Ex.1014).

Xi teaches that its WTRU operates in different modes to provide energy savings. For example, Xi teaches switching to a “baseline mode” for “saving energy,” which is an example of “*enable a power saving mode.*” Ex.1005, [0100]

(“A WTRU may dynamically switch operation capabilities. For example, for saving energy, a WTRU may switch from advanced mode to baseline mode.”); Ex.1008, [0097]. Because of the correlation between BWP and power consumption in a WTRU, it would have been obvious that when the smallest available BWP is used, Xi’s WTRU uses (or “enables”) an operating mode, such as a “baseline mode” (controlled by the “processor”) that consumes a lower power (“power saving mode”), thereby disclosing or rendering obvious claim element [14.1]. Ex.1003, ¶115.

wherein:

[14.2] a total number of turned-on antenna panels in the plurality of antenna panels when the power saving mode is enabled is less than a total number of turned-on antenna panels in the plurality of antenna panels when the power saving mode is disabled; and

As explained above, Xi teaches that a WTRU dynamically switches operation capabilities, e.g., for “saving energy.” Ex.1005, [0100] (“A WTRU may dynamically switch operation capabilities. For example, for saving energy, a WTRU may switch from advanced mode to baseline mode.”); Ex.1008, [0097]. And a WTRU operation “capability” was understood as including a variety of operation aspects, including number of panels used at a given time. Ex.1005, [0090] (“WTRU capabilities may include ... number of panels equipped and used simultaneously/non-simultaneously.”); Ex.1008, [0084]; Ex.1003, ¶¶116-117.

It would have been understood by or obvious to a POSITA that Xi’s

teaching that “[a] WTRU may dynamically switch operation capabilities,” e.g., “for saving energy,” includes a WTRU dynamically switching its number of panels to save energy. Ex.1003, ¶118 (citing Ex.1007, [3] (“[F]or power saving purpose it would be preferable to switch off panels that are not needed e.g. for data transmission and/or reception.”)). A POSITA would have understood that some available antenna panels would have been turned off for the “*power saving mode*” (which is also when the smallest BWP is being used, per the analysis of [14.1]) because the goal is to save energy, thereby rendering obvious claim element [14.2]. Ex.1003, ¶118.

[14.3] *the particular BWP is one of a default BWP, an initial BWP, and a first active BWP.*⁵

Xi discloses that that “the DL active BWP for a WTRU changes dynamically,” and “the UL active BWP for a WTRU changes dynamically,” Ex.1005, [0205]; Ex.1008, [0207]-[0208], which discloses or renders obvious that the first-used “active BWP” in Xi is an example of “*a first active BWP*” as claimed. Ex.1003, ¶¶119-120.

⁵ The '972 Patent defines the expression “at least one of A, B and C,” Ex.1001, 3:62-65, such that only one of “*a default BWP, an initial BWP, and a first active BWP,*” needs to be disclosed to satisfy the claim.

9. Claim 15

[15.0] *A method performed by a wireless communication device for operating a plurality of antenna panels, the method comprising:*

As explained in the analysis of claim element [1.0], Xi discloses a wireless transmit/receive unit (WTRU), which is an example “*wireless communication device*,” as claimed. And as explained in the analysis of claim element [1.1], Xi’s WTRU may include multiple antenna panels, which is an example of “*a plurality of antenna panels*,” as claimed. Various actions/steps discussed below are disclosed as being performed by Xi’s WTRU, therefore disclosing a “method” performed by a wireless communication device. Thus, Xi discloses claim element [15.0]. Ex.1003, ¶121.

[15.1] *maintaining a plurality of leading time values, the plurality of leading time values indicating a plurality of leading time durations;*

Claim element [15.1] is substantively the same as claim element [1.3]. Therefore, see the analysis of [1.3]. Ex.1003, ¶122.

[15.2] *receiving an indicator for antenna panel status information from a base station (BS);*

Claim element [15.2] is substantively the same as claim element [1.4]. Therefore, see the analysis of [1.4]. Ex.1003, ¶123.

[15.3] *applying one of the plurality of leading time values to switch an antenna panel status of the plurality of antenna panels based on the indicator for antenna panel status information;*

Claim element [15.3] is substantively the same as claim element [1.5].

Therefore, see the analysis of [1.5]. Ex.1003, ¶124.

[15.4] receiving a scheduling offset value from the BS, the scheduling offset value comprising at least one of a K0 parameter for a Downlink (DL) channel and a K2 parameter for an Uplink (UL) channel; and

Claim element [15.4] is substantively the same as claim element [1.6].

Therefore, see the analysis of [1.6]. Ex.1003, ¶125.

[15.5] determining that the scheduling offset value is invalid, when a time duration indicated by the scheduling offset value is less than a leading time duration indicated by the applied leading time value.

Claim element [15.5] is substantively the same as claim element [1.7].

Therefore, see the analysis of [1.7]. Ex.1003, ¶126.

10. Claim 16

The method of claim 15, further comprising:

[16.1] receiving a timer from the BS; and

Claim element [16.1] is substantively the same as claim element [2.1].

Therefore, see the analysis of [2.1]. Ex.1003, ¶127.

[16.2] switching the antenna panel status from a first antenna panel status to a second antenna panel status after the timer expires.

Claim element [16.2] is substantively the same as claim element [2.2].

Therefore, see the analysis of [2.2]. Ex.1003, ¶128.

11. Claim 23

The method of claim 15,

[23.1] wherein the indicator for antenna panel status information comprises a multiple-bit Information Element (IE), and the method further comprises:

Claim element [23.1] is substantively the same as claim element [9.1].

Therefore, see the analysis of [9.1]. Ex.1003, ¶129.

[23.2] *turning on a particular number of the plurality of antenna panels when the multiple-bit IE is set to a particular value.*

Claim element [23.2] is substantively the same as claim element [9.2].

Therefore, see the analysis of [9.2]. Ex.1003, ¶130.

12. Claim 24

***The method of claim 15,
[24.1] wherein the indicator for antenna panel status information is contained in a Transmission Configuration Indicator (TCI) state Identity (ID) indicated by the BS.***

Claim element [24.1] is substantively the same as claim element [10.1].

Therefore, see the analysis of [10.1]. Ex.1003, ¶131.

13. Claim 25

***The method of claim 15,
[25.1] wherein the plurality of leading time values is one of cell-specific values and cell group-specific values.***

Claim element [25.1] is substantively the same as claim element [11.1].

Therefore, see the analysis of [11.1]. Ex.1003, ¶132.

14. Claim 26

***The method of claim 15, further comprising:
[26.1] switching the antenna panel status from a first antenna panel status to a second antenna panel status in response to receiving the indicator for antenna panel status information; and***

Claim element [26.1] is substantively the same as claim element [12.1].

Therefore, see the analysis of [12.1]. Ex.1003, ¶133.

[26.2] *automatically switch the antenna panel status from the second antenna panel status to a third antenna panel status without further reception of an indicator for antenna panel status information from the BS.*

Claim element [26.2] is substantively the same as claim element [12.2].

Therefore, see the analysis of [12.2]. Ex.1003, ¶134.

15. Claim 28

The method of claim 15, further comprising:

[28.1] *enabling a power saving mode based on whether the wireless communication device operates in a particular Bandwidth Part (BWP),*

Claim element [28.1] is substantively the same as claim element [14.1].

Therefore, see the analysis of [14.1]. Ex.1003, ¶135.

wherein: [28.2] a total number of turned-on antenna panels in the plurality of antenna panels when the power saving mode is enabled is less than a total number of turned-on antenna panels when the power saving mode is disabled; and

Claim element [28.2] is substantively the same as claim element [14.2].

Therefore, see the analysis of [14.2]. Ex.1003, ¶136.

[28.3] *the particular BWP is one of a default BWP, an initial BWP, and a first active BWP.*

Claim element [28.3] is substantively the same as claim element [14.3].

Therefore, see the analysis of [14.3]. Ex.1003, ¶137.

D. Ground 2: Claims 8, 13, 22, and 27 are obvious under 35 U.S.C. §

103 over Xi combined with Deenoo

1. Summary of Deenoo

Because conflicts may arise between power management and beam management if each are managed separately, Deenoo recognizes that it can be beneficial to coordinate power management and beam management in a WTRU.

Under certain conditions, beam management and power savings may be in conflict with each other. Thus, procedures for joint beam management and power savings are proposed such that the two may be optimized under various conditions.

Ex.1006, [0101]; *see also* [0006] (“A potential conflict may arise if DRX⁶ management and beam management are optimized separately.”).

As a solution to these issues, “procedures for joint beam management and power savings are proposed such that the two may be optimized under various conditions.” *Id.*, [0101]. Deenoo further describes coordinated control of power management and beam management, via a linking/mapping between power savings states and beam management states. Ex.1006, [0147]; Ex.1003, ¶¶138-139.

⁶ “The term Discontinuous Reception (DRX) may refer to any form of power saving applied by a WTRU, which may be characterized by reduced reception and/or transmission activity.” Ex.1006, [0093].

2. Reasons to Combine Xi and Deenoo

As a threshold matter, Xi and Deenoo are analogous art to the '972 patent, as all three documents are directed to the field of cellular communications, such as LTE and 5G/NR systems. Ex.1001, 1:15-16; 4:38-43; Ex.1005, [0026]-[0027]; Ex.1008, [0023]-[0024]; Ex.1006, [0031]-[0032]; Ex.1003, ¶140.

It would have been obvious to a POSITA to combine Xi and Deenoo to provide the obvious, predictable, and beneficial result of coupling Deenoo's power management states with Xi's beam management states to beneficially avoid conflicts between beam management and power management states and reduce signaling overhead that would otherwise be required to manage the two types of states separately, according to the benefits presented in Deenoo. *See* Ex.1006, [0101] (avoid conflict), [0183] ("The linkage between power states (e.g., DRX states) and BM states may be **beneficial to reduce signaling overhead** between the WTRU and the network."); Ex.1003, ¶141.

As further described herein, Xi is directed to "beam management (BM) for new radio," which may include "beam pairing," Ex.1005, [0080], and selection and indication of antenna beams to a WTRU, *see, e.g.*, Ex.1005, [0081] ("BM may include DL layer 1 (L1)/layer 2 (L2) BM procedures for selection of TRP Tx/WTRU Rx beams within one or more TRPs."); Ex.1008, [0076]. Deenoo is likewise directed to beam management, and Deenoo uses the term "beam

management” or “BM” in the same way as Xi, such as referring to properties or characteristics of an antenna beam. Ex.1006, [0156] (“The BM states 21-24 may differ in which types of beams (e.g., wide and/or narrow) are paired between the WTRU and the network, the number of beams paired, the characteristics of the beams themselves, and/or any other parameter associated with beam management procedure.”); [0113]-[0118]; Ex.1003, ¶142.

Deenoo is additionally directed to power management, which can be jointly performed with beam management (BM) in a WTRU. In particular, Deenoo describes “systems, apparatuses, and methods for method for jointly performing beam management and power management in a wireless system,” Ex.1006, [0007], such as “in a wireless transmit/receive unit (WTRU).” *Id.*, [0008]. In Deenoo, power management states and beam management states can be “linked” or “associated,” such as through an “implicit relationship.” *Id.*, [0174] (“As noted above, each of the power states 11-14 is linked to or associated with a different one of the BM states 21-24, for example, via an implicit relationship.”); Ex.1003, ¶143.

As described previously (e.g., in the analysis of claim element [1.4]), Xi describes the use of an N-bit indicator state or TCI state field in DCI for indicating the beam used for a subsequent PDSCH. *See, e.g.*, Ex.1005, [0083] (“NR (New Radio/5G) may utilize dynamic beam indication for PDSCH that may need an N-bit indicator state or TCI state field in the DL-related DCI field for PDSCH beam

indication.”); Ex.1008, [0078]. Consistent with Xi’s teachings, Deenoo recognizes that a “WTRU may be configured by the network to enter a BM state.” Ex.1006, [0200]. When combined with Deenoo’s teachings, Xi’s beam indicator can also indicate a power management state, via an implicit relationship. *Id.*, [0183] (“[A] change in BM state at the WTRU may result in a change of the power saving state of the WTRU based on the configured linkage between BM states and power saving states.”); Ex.1003, ¶144.

Linking beam management states (such as those presented in Xi) and power management states provides some known benefits to a POSITA, as recognized by Deenoo. For example, conflicts between beam management states and power management states can be avoided. Ex.1006, [0101]. Linking beam management (BM) states (such as those presented in Xi) with power management states also beneficially reduces signaling overhead, according to Deenoo. *Id.*, [0183]; Ex.1003, ¶145.

Xi combined with Deenoo also represents combining prior art elements (pairing beam states/indications of Xi with power management states of Deenoo, according to Deenoo’s explicit teachings) according to known methods to yield the predictable and beneficial result of having each beam indication linked to or associated with a different one of power management states to avoid conflicts between the different types of states and reduce signaling overhead. Ex.1003, ¶146.

3. Claim 8

The wireless communication device of claim 1, [8.1] wherein the indicator for antenna panel status information comprises a single-bit Information Element (IE), and the processor is further configured to:

As explained in the analysis of [1.4], Xi discloses a TCI state field that provides a beam indication (example “*indicator for antenna panel status information*”) and that is represented by N bits. Ex.1005, [0083]; Ex.1008, [0078].

The range of values of N encompasses one bit (reflecting two possible values for the TCI state), thereby disclosing or rendering obvious claim element [8.1].

Ex.1003, ¶¶148-149.

[8.2] enable a power saving mode when the single-bit IE is set to a first value; and disable the power saving mode when the single-bit IE is set to a second value, wherein a total number of turned-on antenna panels in the plurality of antenna panels when the power saving mode is enabled is less than a total number of turned-on antenna panels in the plurality of antenna panels when the power saving mode is disabled.

Xi renders obvious claim element [8.2]. Xi combined with Deenoo also renders obvious [8.2].

It would have been obvious to a POSITA that if Xi commands a WTRU to switch between a beam with a high beamforming gain and a beam with a low beamforming gain using a single-bit TCI indicator, a different number of antenna elements (e.g., using a different number of antenna panels) may be used to generate the different beamforming gains. Ex.1003, ¶151. For example, Deenoo explains what POSITAs understood.

Beamforming may be also desired to compensate for increased pathloss at higher frequencies (e.g. >6 GHz). **A large number of antenna elements may be used to achieve higher beamforming gain.**

Ex.1006, [0091]. A POSITA would have understood that a higher beamforming gain is achieved at the expense of increased power consumption. For example, Deenoo explains that a high beamforming gain may no longer be needed when a WTRU enters a sleep cycle (“DRX cycle”), which is a low-power cycle. Ex.1006, [0176]; Ex.1003, ¶151.

Further, Xi teaches that its WTRU operates in different modes to provide energy savings. For example, Xi teaches switching to a “baseline mode” for “saving energy,” which is an example of “*enable a power saving mode.*” Ex.1005, [0100] (“A WTRU may dynamically switch operation capabilities. For example, for saving energy, a WTRU may switch from advanced mode to baseline mode.”); Ex.1008, [0097]. It would have been obvious for the WTRU to enter a “baseline mode” for “saving energy,” such as switching off RF circuitry, when a beam with a high beamforming gain is indicated using the TCI and a smaller number of antenna panels is used, as compared to a state of using a larger number of antenna panels when a beam with a low beamforming gain is indicated, thereby rendering obvious [8.2]. Ex.1003, ¶152.

Xi combined with Deenoo also renders obvious [8.2].

Deenoo describes coordinated control of power management and beam

management, via a linking between power savings states and beam management states. Ex.1006, [0147]; [0174]. There are a variety of potential parameters related to Deenoo's beam management procedures, including properties or characteristics of a beam. *Id.*, [0113]-[0118], [0156]; Ex.1003, ¶¶154-156.

Thus, Xi's one-bit TCI indicator that indicates a selected beam (*"single bit IE is set to a first value" or "a second value"*), in view of Deenoo's teaching that there is an implicit linking between a beam management (BM) state and a power state, such that one beam selection (*"first value"*) is implicitly associated with a power state (e.g., *"power savings mode"*) and another beam selection (*"second value"*) is implicitly associated with another power state, renders obvious [8.2]. When the TCI value is set to a first value, the number of turned on antenna panels is less than when the TCI value is set to a second value (*"wherein a total number of turned-on antenna panels in the plurality of antenna panels when the power saving mode is enabled is less than a total number of turned-on antenna panels in the plurality of antenna panels when the power saving mode is disabled"*). Ex.1003, ¶157.

4. Claim 13

The wireless communication device of claim 1, wherein the processor is further configured to:

[13.1] enable a power saving mode when the wireless communication device operates in a Discontinuous Reception (DRX) active time; and disable the power saving mode when the wireless communication device operates in a DRX inactive time,

Xi in view of Deenoo discloses or renders obvious claim element [13.1]. As discussed in association with claim 14, Xi teaches that a WTRU dynamically switches operation modes for “saving energy.” Ex.1005, [0100] (“A WTRU may dynamically switch operation capabilities. For example, for saving energy, a WTRU may switch from advanced mode to baseline mode.”); Ex.1008, [0097]; Ex.1003, ¶158.

Deenoo discloses sending a DRX command to a WTRU to transition from a non-DRX state (an example “*DRX inactive time*”) to a DRX state (an example “*DRX active time*”):

Another trigger associated with a DRX state may **be receipt of a DRX command from the network (e.g., a base station)**. The WTRU may implicitly **transition to a predefined BM state based on reception of a DRX command from the network...** That is, **the network may order a WTRU in a non-DRX state to enter DRX by transmitting an explicit DRX command.**

Ex.1006, [0189].

The transition to a beam management state may also trigger a transition to a

power state, due to the linkage between beam management states and power states as described in the analysis of claim element [8.2]. Ex.1006, [0147] (“According to one or more embodiments, a set of power savings states ... may be linked or mapped with beam management states (e.g., different levels of beam management), such that a transition between two states at the power savings procedure may induce similar transition at the beam management level, and vice-versa.”); [0174]; Ex.1003, ¶¶159-161.

Thus, Xi’s teaching of a power saving mode in view of Deenoo’s teaching of a WTRU receiving a DRX command, which triggers a transition to a beam management state and an associated power state, discloses or renders obvious “*enable a power saving mode when the wireless communication device operates in a Discontinuous Reception (DRX) active time.*” Ex.1003, ¶162.

[13.2] wherein a total number of turned-on antenna panels in the plurality of antenna panels when the power saving mode is enabled is less than a total number of turned-on antenna panels in the plurality of antenna panels when the power saving mode is disabled.

Deenoo’s DRX command triggers an associated change in power state, and a power state may reflect the RF configuration. Ex.1006, [0174] (“a WTRU may be configured with a set of power states 11-14 having different levels of ... RF configuration.”). Further, the RF configuration was understood as reflecting the number of antenna panels, according to Xi. Ex.1005, [0090] (“WTRU capabilities may include ... number of panels equipped and used simultaneously/non-

simultaneously”); Ex.1008, [0084]. And one objective of DRX was to save power.

Ex.1006, [0005] (“Thus, a focus of DRX management may be to enable power savings when there is no data activity at the UE.”). Ex.1003, ¶163-164.

It was well-known to a POSITA that higher beamforming gain in a WTRU is achieved at the expense of increased WTRU power consumption (e.g., via the use of increased hardware capability to support an increased number of antenna elements). Ex.1003, ¶164. Consistent with this principle, Deenoo recognizes that when a sleep mode is used in a WTRU (e.g., a long DRX cycle), it is desirable to exit a beam management mode that uses high beamforming gain. Ex.1006, [0176], [0180]; Ex.1003, ¶164. Thus, it would have been understood or obvious to a POSITA that fewer antenna panels are needed to be activated when a WTRU simply wakes up to monitor a control channel (e.g., one antenna panel may suffice), as compared to when a data transmission is being received (e.g., on a data channel, such as PDSCH). *See also* Ex.1006, [0187] (“For example, a WTRU in the first BM state (e.g., BM state A) during the start of the on-duration may transition to the second BM state (e.g., BM state B) upon receiving a valid scheduling grant while monitoring the PDCCH.”). Such WTRU operation of reducing the number of panels that are turned on is consistent with an objective of power or DRX management, which is to save power when there is no data activity. *Id.*, [0005] (“Thus, a focus of DRX management may be to enable power savings

when there is no data activity at the UE.”); Ex.1007, [3]; Ex.1003, ¶164.

Accordingly, it would have been obvious to a POSITA that the number of panels in Xi’s WTRU used in a low power state associated with waking up every so often to monitor a control channel would have been less than the number of panels in a power state associated with data transmission, thereby rendering obvious claim element [13.2]. Ex.1003, ¶165.

5. Claim 22

The method of claim 15, [22.1] wherein the indicator for antenna panel status information comprises a single-bit Information Element (IE), and the method further comprises:

Claim element [22.1] is substantively the same as claim element [8.1].

Therefore, see the analysis of [8.1]. Ex.1003, ¶166.

[22.2] enabling a power saving mode when the single-bit IE is set to a first value; and disabling the power saving mode when the single-bit IE is set to a second value, wherein a total number of turned-on antenna panels in the plurality of antenna panels when the power saving mode is enabled is less than a total number of turned-on antenna panels in the plurality of antenna panels when the power saving mode is disabled.

Claim element [22.2] is substantively the same as claim element [8.2].

Therefore, see the analysis of [8.2]. Ex.1003, ¶167.

6. Claim 27

The method of claim 15, further comprising: [27.1] enabling a power saving mode when the wireless communication device operates in a Discontinuous Reception (DRX) active time; and disabling the power saving mode when the wireless communication device operates in a DRX inactive time,

Claim element [27.1] is substantively the same as claim element [13.1].

Therefore, see the analysis of [13.1]. Ex.1003, ¶168.

[27.2] wherein a total number of turned-on antenna panels in the plurality of antenna panels when the power saving mode is enabled is less than a total number of turned-on antenna panels in the plurality of antenna panels when the power saving mode is disabled.

Claim element [27.2] is substantively the same as claim element [13.2].

Therefore, see the analysis of [13.2]. Ex.1003, ¶169.

X. DISCRETIONARY DENIAL WOULD BE INAPPROPRIATE

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) (memo from Director applying the *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.1020, 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*”); *see also Dish Network L.L.C. v. Broadband iTV, Inc.*, IPR2020-01359, Paper 15 at 11 (Feb. 12, 2021) (“It would be improper to speculate, at this stage, what the Texas court might do regarding a motion to stay...”). 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, 2023;⁷ and trial will not commence until April 1, 2024. Ex.1018, 2-3. This trial schedule, however, is likely to be vacated because Apple and Togail agree that the case should be transferred to a California district. Ex.1019, 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.1020, 1-3. This uncertainty weighs in favor of institution. *See Sand* at 8-10, 14.

⁷ 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.

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.1021, 37 (showing median time-to-trial of 28.9 months). This factor heavily favors institution.

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.1019, 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.1018, 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.1018, 3. The extent of overlap is thus speculative at this point in time. Additionally, Petitioner challenges multiple claims (claims 2, 9, 10, 16, 23 and 24) that are not asserted in the plaintiff's preliminary infringement contentions, Ex.1018, 2, thereby reducing overlap.

5. Petitioner is a defendant

Petitioner is a defendant in the co-pending litigation. That is true of most Petitioners in IPR proceedings, making this factor neutral. *See HP Inc. v. Slingshot Printing LLC*, IPR2020-01084, Paper 13 at 9 (PTAB Jan. 14, 2021) (having the “same parties as parallel proceeding” makes factor 5 “neutral”).

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. Additionally, Patent Owner has engaged in a campaign of asserting the '972 patent against multiple defendants across the industry, including Samsung Electronics Co., Motorola Mobility LLC, Google LLC, TCL Technologies, and TCT Mobile, among other TCL/TCT entities. *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

Apart from Petitioner's showing that the *Fintiv* factors favor institution, the *Fintiv* framework should be overturned because it (1) exceeds the Director's authority, (2) is arbitrary and capricious, and (3) was adopted without notice-and-comment rulemaking.

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 '972 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 relied upon here teaches the claim elements that the Examiner deemed allowable. *See supra*, Section VI.

XI. CONCLUSION

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

Respectfully submitted,

Dated: March 17, 2023
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Customer No. 27683

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

XII. 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 '972 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

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

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), Petitioner hereby certifies, in accordance with and reliance on the word count provided by the word-processing system used to prepare this Petition, that the number of words in this paper is 13,389. 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 17, 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 17, 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. 10,972,972; Petitioner's Exhibit List; Exhibits 1001-1024.

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