

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

TOGAIL TECHNOLOGIES LTD.,
Patent Owner.

IPR2023-00721
Patent 10,972,972 B2

Before JAMESON LEE, GREGG I. ANDERSON, and
SHEILA F. McSHANE, *Administrative Patent Judges*.

LEE, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Apple Inc. (“Petitioner”) filed a Petition requesting an *inter partes* review of claims 1–2, 8–16, and 22–28 (“challenged claims”) of U.S. Patent No. 10,972,972 B2 (Ex. 1001, “the ’972 patent”) pursuant to 35 U.S.C. §§ 311–319. Paper 2. Togail Technologies, Ltd. (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”).

We have authority to determine whether to institute review under 35 U.S.C. § 314 and 37 C.F.R. § 42.4. Upon consideration of the contentions and the evidence of record before us, we conclude Petitioner has shown a reasonable likelihood that it would prevail in establishing unpatentability of at least one challenged claim of the ’972 patent. Accordingly, we institute an *inter partes* review of all challenged claims of the ’972 patent on all grounds set forth in the Petition.

II. BACKGROUND

A. *Real Parties-in-Interest*

Petitioner identifies only itself as real party-in-interest. Pet. 67. Patent Owner identifies only itself as the real party-in-interest. Paper 3, 2.

B. *Related Matters*

Petitioner identifies the following district court litigations involving the ’972 patent as related matter: *Togail Technologies Ltd. v. Apple Inc.*, No. 6-22-cv-00326 (W.D. Tex.); *Togail Technologies Ltd. v. Samsung Electronics Co., Ltd., et al.*, No. 6-22-cv-00328 (W.D. Tex.); *Togail Technologies Ltd. v. Motorola Mobility LLC*, No. 1-22-cv-02176 (N.D. IL.); *Togail Technologies Ltd. v. Google LLC*, No. 6-22-cv-00327 (W.D. Tex.); *Togail Technologies Ltd. v. TCL Technology Group Corp., et al.*, No. 2-23-cv-00039 (E.D. Tex.). Pet. 67. Patent Owner identifies only *Togail*

Technologies Ltd. v. Apple Inc., No. 6-22-cv-00326 (W.D. Tex.) as related matter. Paper 3, 2.

C. The '972 Patent

The '972 patent describes a wireless communication device including a plurality of antenna panels and a processor coupled to the antenna panels. Ex. 1001, 1:44–46. The processor is configured to maintain a plurality of leading time values which, in turn, indicate a plurality of leading time durations. *Id.* at 1:47–50. The processor also is configured to receive an indicator for antenna status information from a base station (BS), and to apply one of the plurality of leading time values to switch an antenna panel status of the plurality of antenna panels based on the received indicator for antenna status information. *Id.* at 1:50–55. The lead time as a duration for beam switching depends on how many antenna panels are involved in making the switch. *See id.* at 8:14–19. The indicator for antenna panel status may be transmitted from the BS to the UE (user equipment) via a DCI [Downlink Control Information] message, a MAC-CE [Medium Access Control Element] message, or RRC [Radio Resource Control] signaling. *Id.* at 10:64–66.

Figure 1 is reproduced below:

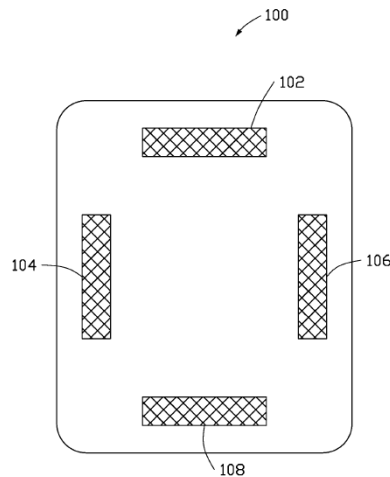


FIG. 1

Figure 1 illustrates a wireless communication device including a number of antenna panels 102, 104, 106, and 108. Ex. 1001, 2:8–11.

Wireless communication device 100 includes four antenna panels 102, 104, 106, and 108 which may include a number of physical antennas. *Id.* at 7:4–9. The ON/Off state of each antenna panel may be switched by wireless communication device 100. *Id.* at 7:12–14. Depending on the ON/OFF state of each antenna panel, the collection of antenna panels have different antenna panel status. *Id.* at 7:14–16. For instance, a first antenna panel status may be that antenna panel 102 is on and the other antenna panels are off, and a second antenna panel status may be that all antenna panels 102, 104, 106, and 108 are on. *Id.* at 7:16–22. In general, the antenna panel status “may be defined arbitrarily based on the ON/OFF states and/or the number of the antenna panels.” *Id.* at 7:30–33.

Figure 2 is reproduced below:

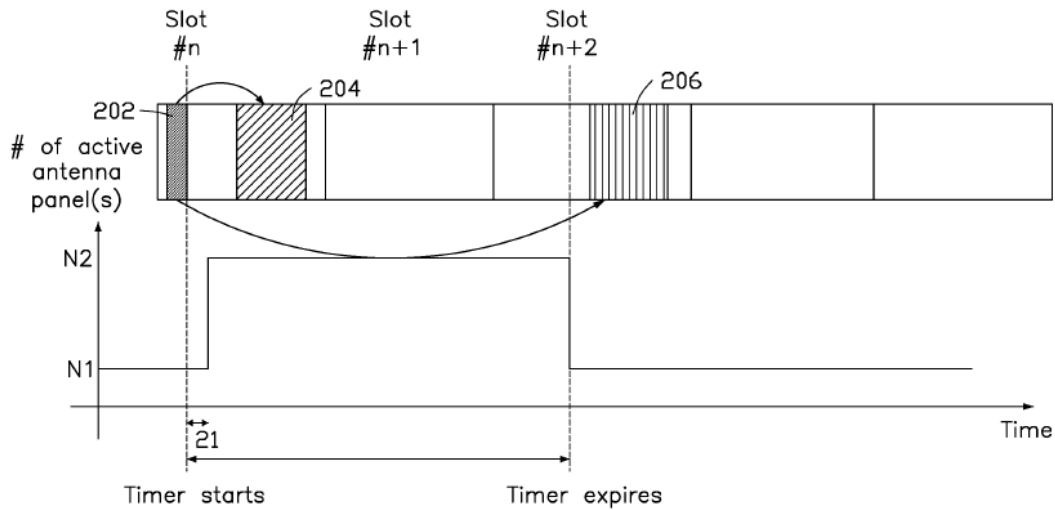


FIG. 2

Figure 2 illustrates a timeline of an antenna panel status of a wireless communication device. *Id.* at 2:12–15.

Time gap 21 exists between the time the UE receives the indicator for antenna panel status from PDCCH 202 and the time the UE actually turns on the N2 antenna panels. *Id.* at 14:31–34. Time gap 21 reflects the time required for the UE to turn on the antenna panels according to the received indicator for antenna panel status and may be deemed as the leading time duration for beam switching of the UE. *Id.* at 14:34–38. The '972 patent further describes:

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 occur.

Id. at 6:24–31.

The '972 patent describes a potential issue with scheduling offset values. *Id.* at 8:14–21. A “scheduling offset” is described in the '972 patent as follows:

[T]he scheduling offset may be referred [to] as a time period starting from the end of a PDCCH to the beginning of a PDSCH. For example, the scheduling offset may be a time period that starts from the first symbol after the end of the PDCCH to the first symbol of the PDSCH scheduled by the PDCCH.

Id. at 8:5–10; *see also id.* at 6:46–49.¹ The '972 patent explains a potential problem with mis-matched scheduling offset and leading time duration:

However, for a scheduling offset value configured for a UE [user equipment] that includes only one antenna panel (or a single-antenna-panel UE), such value may not fulfill the leading time for beam switching required by another UE that includes multiple antenna panels (or a multiple-antenna-panel UE). Thus, a mechanism that is able to deal with how the UE determines which scheduling offset value (e.g., Threshold-Sched-Offset) to be applied may be needed.

Id. at 8:14–21; *see also id.* at 9:2–6 (“If 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.”). The '972 patent addresses the problem: “If the time duration indicated by the scheduling offset value is less than the leading time

¹ Petitioner asserts that the term “scheduling offset” or “scheduling offset value” was a term of art known to a person of ordinary skill in the art 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. Pet. 6. “In effect a ‘scheduling offset’ is used by a transmitter to tell a receiver when to expect a data channel transmission.” *Id.* These assertions are not disputed by Patent Owner.

duration indicated by a selected leading time value, the UE may further determine that the scheduling offset is invalid.” *Id.* at 17:38–42.

Claims 1 and 15 are independent and reproduced below:²

- [1.0] A wireless communication device, comprising:
 - [1.1] a plurality of antenna panels;
 - [1.2] a processor coupled to the plurality of antenna panels and configured to:
 - [1.3] maintain a plurality of leading time values, the plurality of leading time values indicating a plurality of leading time durations;
 - [1.4] receive an indicator for antenna panel status information from a base station (BS);
 - [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;
 - [1.6] receive a scheduling offset value from the BS, the scheduling offset value comprising one of a K0 parameter for a Downlink (DL) channel and a K2 parameter for an Uplink (UL) channel; and
 - [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.

Ex. 1001, 31:8–28.

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

² The bracketed captions correspond to those used by Petitioner to reference the claim elements. *See* Pet. 20–34, 47–48. We use the same here for ease of reference, understanding, and consistency.

- [15.1] maintaining a plurality of leading time values, the plurality of leading time values indicating a plurality of leading time durations;
- [15.2] receiving an indicator for antenna panel status information from a base station (BS);
- [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;
- [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
- [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.

Id. at 32:65–33:17.

D. Evidence relied on by Petitioner

Petitioner relies on the following references:³

³ The '972 patent issued from Application No. 16/511,170, filed July 15, 2019, and claims priority to Provisional Application No. 62/699,465, filed July 17, 2018. Ex. 1001, codes (21), (22), (60). Petitioner has not challenged the '972 patent's entitlement to the filing date of Provisional Application No. 62/699,465.

Name	Patent Document	Exhibit
Xi ⁴	US 2020/0288479 A1	1005
Deenoo ⁵	US 2019/0261287 A1	1006

Petitioner also relies on the Declaration of Zhi Ding, Ph.D. Ex. 1003. Patent Owner's Preliminary Response does not rely on the testimony of any expert witness.

E. Asserted Grounds of Unpatentability

Petitioner asserts that the challenged claims of the '972 patent are unpatentable based on the following grounds (Pet. 15, 50):

Claims Challenged	35 U.S.C. § ⁶	Reference(s)/Basis
1, 2, 9–12, 14–16, 23–26, 28	103	Xi
8, 13, 22, 27	103	Xi, Deenoo

⁴ Published Sept. 10, 2020, based on Application No. 16/763,609, with a PCT filing date of Nov. 15, 2018, based on PCT Application PCT/US2018/061267. Ex. 1005, codes (21), (22), (43), (86). Xi claims priority to Provisional Application No. 62/586,612, filed Nov. 15, 2017, Provisional Application No. 62/615,715, filed Jan. 10, 2018, Provisional Application No. 62/630,649, filed Feb. 14, 2018, Provisional Application No. 62/652,805, filed April 4, 2018 (Ex. 1008), and Provisional Application No. 62/716,215, filed Aug. 8, 2018. *Id.* at code (60).

⁵ Published Aug. 22, 2019, based on Application No. 16/346,785, with a PCT filing date of Oct. 27, 2017, based on PCT Application PCT/US2017/058739. Ex. 1006, codes (21), (22), (43), (86). Deenoo claims priority to Provisional Application No. 62/416,622, filed Nov. 2, 2016. *Id.* at code (60).

⁶ The Leahy-Smith America Invents Act, Pub. L. No. 112–29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. §§ 102 and 103. Based on the record before us, we preliminarily determine that the '972 patent has an effective filing date subsequent to the effective date of the applicable AIA amendments (March 16, 2013). We, therefore, refer to the AIA version of 35 U.S.C. § 103.

III. ANALYSIS

A. *Level of Ordinary Skill in the Art*

Petitioner asserts that a person of ordinary skill in the art as of July 17, 2018,

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.

Pet. 9–10 (citing Ex. 1003 ¶¶ 19–21). Dr. Ding clarifies that the referenced Ph.D. degree would be in the same disciplines listed for the Master’s degree. Ex. 1003 ¶ 20.

Patent Owner states that for purposes of its Preliminary Response, it “does not dispute” Petitioner’s proposed level of ordinary skill in the art. Prelim. Resp. 7.

At this preliminary stage and on this record, we adopt Petitioner’s articulation, both alternatives, as the level of ordinary skill in the art, except that we delete the modifier “at least,” because inclusion of “at least” creates a range with no upper bound thus causing the definition to cover levels beyond what is mere ordinary skill and, consequently, unusable as stated. The modified statement, instead, appears consistent with what is reflected by the content of the applied prior art references. *Cf. Okajima v. Bourdeau*, 261 F.3d 1350, 1354–55 (Fed. Cir. 2001) (the applied prior art may reflect an appropriate level of skill).

B. *Claim Construction*

We use the same claim construction standard that would be used to construe a 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) (2022). The claim construction standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc) is applicable.

Claim terms are generally given their ordinary and customary meaning as would be understood by one with ordinary skill in the art in the context of the specification, the prosecution history, other claims, and extrinsic evidence including expert and inventor testimony, dictionaries, and learned treatises, although extrinsic evidence is less significant than the intrinsic record. *Phillips*, 415 F.3d at 1312–17. Usually, the specification is dispositive, and it is the single best guide to the meaning of a disputed term. *Id.* at 1315.

The specification may reveal a special definition given to a claim term by the patentee, or the specification or prosecution history may reveal an intentional disclaimer or disavowal of claim scope by the inventor. *Id.* at 1316. If an inventor acts as his or her own lexicographer, the definition must be set forth in the specification with reasonable clarity, deliberateness, and precision. *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998). The disavowal, if any, can be effectuated by language in the specification or the prosecution history. *Poly-Am., L.P. v. API Indus., Inc.*, 839 F.3d 1131, 1136 (Fed. Cir. 2016).

Only those claim terms that are in controversy need to be construed, and only to the extent necessary to resolve the controversy. *Realtime Data, LLC v. Iancu*, 912 F.3d 1368 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent

necessary to resolve the controversy.” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

1. “*an indicator for antenna panel status information*”

The term “an indicator for antenna panel status information” appears in both independent claims 1 and 15. Citing portions of the ’972 patent, Petitioner explains that an 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 device are turned on (or active, or able to transmit and receive data), and/or how many, or which, of the antenna panels of the device are turned off (or inactive, or not able to transmit and receive data). Pet. 12 (citing Ex. 1001, 10:4–10, 14:53–55). On that basis, Petitioner asserts that the term “*an indicator for antenna panel status information*” means “any implicit or explicit indication of how many, or which, antenna panels are turned on or off.” *Id.* (citing Ex. 1003 ¶¶ 39–40).

On the meaning of this term, Patent Owner has not presented arguments to the contrary and also has not proposed its own construction. We find Petitioner’s explanation to be cogent, reasonable, and supported by the cited evidence. Thus, at this juncture, we adopt Petitioner’s proposed construction. For the purposes of this Decision we interpret that the term “*an indicator for antenna panel status information*” means “any implicit or explicit indication of how many, or which, antenna panels are turned on or off.”

2. “*leading time value*” and “*leading time duration*”

The terms “leading time values” and “leading time durations” appear in both independent claims 1 and 15.

Petitioner asserts that the '972 patent defines “leading time value” or “leading time duration” as “the time required [] for a mobile station with at least one antenna panel to switch beams after receiving a beam switch command.” Pet. 23–24 (citing Ex. 1001, 6:23–31). The '972 patent states:

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 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. Although this passage presents an example of what may be regarded as “leading time value” and “leading time duration,” in our view it does not include a definition for any term.

Patent Owner’s position parallels our observation that Petitioner’s proposed claim interpretation is not a definition but rather an example. Patent Owner states that in Petitioner’s arguments for its proposed construction for the term “leading time value,” Petitioner “ignores the use of this term in the claims and throughout the specification.” Prelim. Resp. 7. Patent Owner also states:

Moreover, even though Petitioner quotes the specification of the '972 Patent for the alleged definition of this term, it does not explain the reason for departing from the clear teaching provided in the specification with respect to the meaning of this term beyond “beam switching” and, consequently, impermissibly excludes preferred embodiments.

Id. at 8.

As we discussed above, however, we find that the cited portion of the Specification presents an example of a “leading time value” and “leading time duration,” but does not represent a definition for the terms. For

instance, Patent Owner identifies an example in the Specification of the '972 patent, illustrated in Figure 23, “that describes ‘leading time values’ and ‘leading time durations’ that are not in the context of beam switching.” *Id.* at 9. Contrary to Patent Owner’s assertion, that embodiment is not excluded, as we recognize and find that what Petitioner has referred to in the Specification is not a definition, but an example of what can be “leading time values” and “leading time durations.” We need not define precisely the outer boundaries of “leading time values” and “leading time durations” to resolve any dispute here.

The real question that Patent Owner could take issue with, and does not appear to address, is whether “leading time value” or “leading time duration” is permissibly met by “the time required [] for a mobile station with at least one antenna panel to switch beams after receiving a beam switch command” in the context of the '972 patent. *See* Pet. 23–24 (citing Ex. 1001, 6:23–31). As we discussed above, we agree with Petitioner that “leading time value” and “leading time duration” permissibly can be met by “the time required for a mobile station with at least one antenna panel to switch beams after receiving a beam switch command.” We address Patent Owner’s further arguments below.

Patent Owner argues:

The claims at issue all expressly require that the device 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.**” (Ex. 1001, 31:7–28.) The **leading time values** are not just time values relating to beam switching. For example, the specification describes **the leading time values** with respect to the time it takes to turn on a set of antenna panels. (*See id.*, 21:11:27 (“[T]he UE may apply a first leading time when the UE needs to

turn on a first number of antenna panel(s), and apply a second leading time when the UE needs to turn on a second number of antenna panel (s)").)

Prelim. Resp. 8–9 (*italics omitted*). Patent Owner further asserts:

Indeed, based on the express language of the claims and consistent with the specification, the **leading time values** are not just time values relating to beam switching, but rather time values/durations specifically related to **switching the status of the plurality of antenna panels of the given wireless communication device**.

Id. at 9.

For its position that “leading time value” and “leading time duration” can be met by “the time required [] for a mobile station with at least one antenna panel to switch beams after receiving a beam switch command,” Petitioner explains:

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 building 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).

Pet. 26–27. Petitioner’s explanation that beam switching implicitly calls for changing or modifying antenna panel status from the present antenna panel status to that required by the new beam is cogent, rational, and supported by the cited evidence. Patent Owner has presented little to undermine Petitioner’s reasoning. Patent Owner asserts that “[e]ven if the TCI implies beam selection, this is not an indicator from the BS that instructs the device to switch the status of the plurality of antenna panels, as required by the claims.” Prelim. Resp. 13. Patent Owner, however, has not provided explanation on why Petitioner’s reasoning is wrong that because new beam selection implicitly changes antenna panel status to one that corresponds to

the new beam, a beam indicator is an indicator of antenna panel status information.

Patent Owner further asserts that “Petitioner’s construction conflicts with the express limitations of the claims, which require a ‘*plurality*’ of antenna panels, not ‘at least one panel’ per Petitioner’s proposed construction.” Prelim. Resp. 8. The argument is misplaced. No conflict with the rest of the claim limitations exist, that is, to state “at least one panel” in the meaning of “leading time value” and “leading time duration,” because the recitation of a “plurality” of antenna panels elsewhere in the claim simply further narrows the claim scope.

For the foregoing reasons, we construe “leading time value” and “leading time duration” as a value or duration that can be met by “the time required for a mobile station with at least one antenna panel to switch beams after receiving a beam switch command.” This is the same construction proposed by Petitioner, except that we do not regard the meaning as restrictive in scope, i.e., we do not rule out other ways in which the terms may be met. No further construction is necessary to resolve any dispute in this case.

C. Alleged Obviousness of Claims 1, 2, 9–12, 14–16, 23–26, and 28 over Xi

1. Overview of Xi

Xi discloses a wireless transmit/receive unit (“WTRU”) which receives a physical downlink control channel (“PDCCH”) having downlink control information (“DCI”) including scheduling offset and an indicated beam for a scheduled physical downlink shared channel (“PDSCH”) reception. Ex. 1005, code (57). When the scheduling offset of the

scheduled PDSCH is less than a threshold, a default beam of a transmission configuration indication (“TCI”) state is utilized to receive the scheduled PDSCH. *Id.* Figure 1 of Xi is reproduced below:

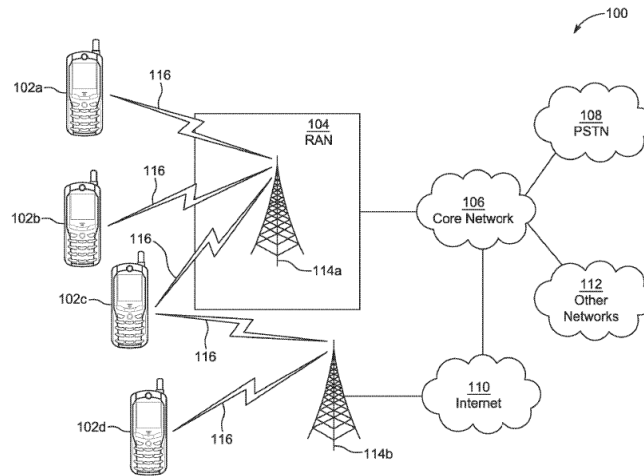


FIG. 1A

Figure 1A illustrates an example of a communication system according to Xi. Ex. 1005 ¶ 5.

System 100 is a multiple access system that provides content, such as voice, data, video, messaging, and broadcast. *Id.* ¶ 20. Multiple wireless users access such content through sharing of resources, including wireless bandwidth. *Id.* System 100 includes WTRUs 102a, 102b, 102c, 102d, a radio access network (RAN) 104, a core network (CN) 106, a public switched telephone network (PSTN) 108, the Internet (110), and other networks 112. *Id.* ¶ 21. System 100 also includes base station 114a and/or base station 114b, each of which may be any type of device configured to interface with at least one of the WTRUs to facilitate access to one or more communication networks such as CN 106, Internet 110, or other networks 112. *Id.* ¶ 22. Base station 114a may be a part of RAN 104 which may include other base stations. *Id.* ¶ 23.

WTRUs 102a, 102b, 102c, and 102d “may include a user equipment (UE), a mobile station, a fixed or mobile subscriber unit, a subscription-based unit, a pager, a cellular phone, a personal digital assistant (PDA), a smart phone, a laptop, a netbook, a personal computer . . . and the like.”). *Id.* WTRUs 102a, 102b, 102c, and 102d may be referred to as a UE. *Id.* ¶ 26.

Figure 2 of Xi is reproduced below:

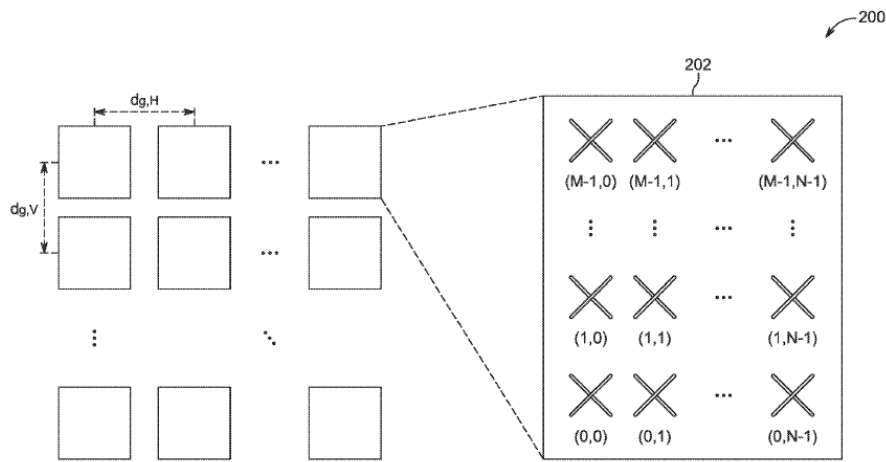


FIG. 2

Figure 2 illustrates a transmission reception point (TRP) and a WTRU antenna model. *Id.* ¶¶ 9, 77. Antenna model 202 includes “Mg” antenna panels in the vertical dimension and “Ng” antenna panels in the horizontal dimension. *Id.* ¶ 77. Each antenna panel is configured with N columns and M rows of antenna elements. *Id.*

Xi refers to a value of estimated time duration, “threshold K,” for a WTRU to perform “TCI decoding, blind decoding, RF tuning, *beam switching*, or the like if a new Rx beam is needed.” *Id.* ¶ 89 (emphasis added). Xi describes that “threshold K” may depend on WTRU capability, network design, and other factors. *Id.* ¶ 90. Xi also describes that

“threshold K” may be pre-specified or configured. *Id.* ¶ 91. More specifically, Xi further describes that a WTRU may be pre-specified or configured with one or more values of threshold K for different types of service. *Id.* ¶ 92. Xi still further describes that “threshold K” “may be configured, selected, determined, calculated, or the like by a network device, gNB, TRP, WTRU, mobile device, or the like.” *Id.* ¶ 93.

Additionally, Xi describes that “[t]he 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.” *Id.* ¶ 94. “Once a WTRU chooses threshold K, the value may be reported, signaled, or the like to the network for scheduling resources, such as a subsequent NR-PDSCH allocation.” *Id.*

According to Xi, a scheduling offset for subsequent PDSCH reception is received by a WTRU within the DCI in a PDCCH. *Id.* ¶ 107. Xi further indicates that the DCI includes an indicator specifying the antenna beam for PDSCH reception. *Id.* ¶¶ 83, 86.

Xi describes a potential problem. Specifically,
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. ¶ 109 (emphasis added). In other words, if no change is made to the antenna configuration when the scheduling offset is determined to be less than threshold K, then the symbols scheduled prior to expiration of threshold K duration would be lost. Xi further describes what suitable Rx beam, in that circumstance, for the WTRU to use. *Id.* ¶ 110. Specifically, a preconfigured beam may be set as a default beam to use in that

circumstance. *Id.* Alternatively, Xi describes that, in that circumstance, “[a] WTRU may apply a suitable Rx beam by various operations without using a pre-configured beam, default beam, or the like.” *Id.* ¶ 111. Xi describes that a WTRU “may obtain suitable Rx beam information based on pre-defined rules.” *Id.* ¶ 113.

Figure 4 of Xi is reproduced below:

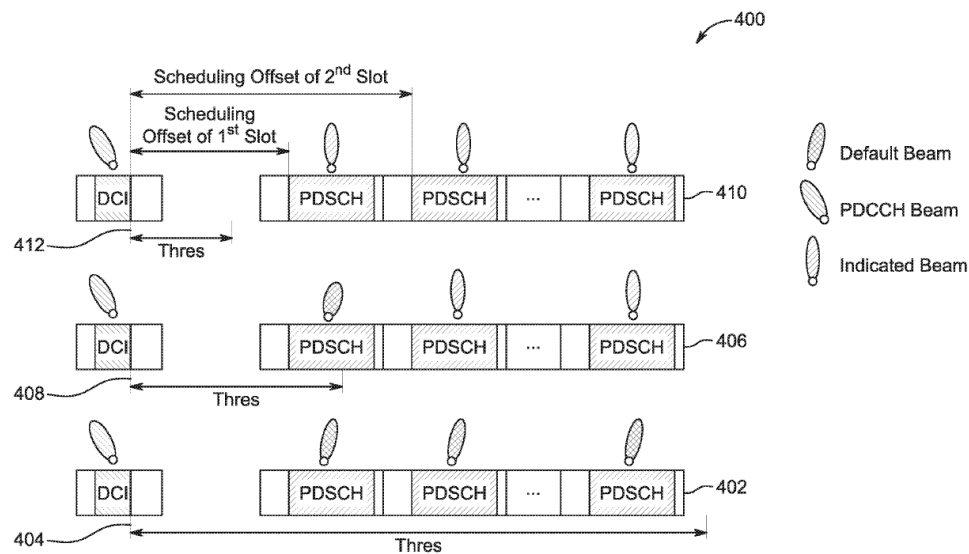


FIG. 4

Figure 4 shows a “quasi-colocation (QCL) assumption” for a multi-slot PDSCH configuration. *Id.* ¶ 11.

As shown in example 410, the scheduling offset for the first and second slots are each greater than threshold K 412 and thus the indicated beam may be used *Id.* ¶ 117. In example 402, however, the scheduling offset for the first slot is less than threshold K 404. For that scenario, Xi describes:

If multi-slot PDSCH 402 is scheduled with slot aggregation and the scheduling offset of the scheduled PDSCH in the first scheduled slot is less than the threshold value 404, the spatial QCL assumption, special Rx parameter, Rx beam or the like used

for PDSCH reception may be based on a default assumption, predefined rules, or the like.

Id. ¶ 116. For example 406, Xi describes:

In multi-slot PDSCH 406, a WTRU may apply a default beam for PDSCH reception for the slot where the first symbol of the scheduled PDSCH is less than threshold value 408, and then may apply the indicated beam for all subsequent scheduled slots where the first symbol of the scheduled PDSCH is later than threshold value 408.

Id. ¶ 117.

2. *Independent Claim 1*

a) *Recitation [1.0]*

In its preamble, claim 1 recites: “A wireless communication device, comprising.” Ex. 1001, 31:8. Petitioner asserts that Xi discloses a WTRU, which is a wireless communication device. Pet. 20–21 (citing Ex. 1005 ¶ 0021, Fig. 1B; Ex. 1008 ¶ 0034, Fig. 1B; Ex. 1003 ¶¶ 53–54). Petitioner’s assertions are supported by the cited evidence. Patent Owner does not present argument to the contrary. We are sufficiently persuaded that Xi discloses “[a] wireless communication device.” It is not necessary to determine whether the preamble recitation is limiting.

b) *Limitation [1.1]*

Claim 1 recites: “a plurality of antenna panels.” Ex. 1001, 31:9. On page 22 of the Petition, Petitioner produces a color-annotated version of Figure 2 of Xi, reproduced below:

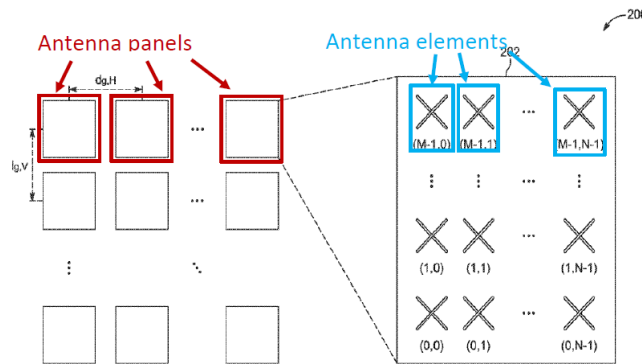


FIG. 2

Figure 2 illustrates a transmission reception point (TRP) and a WTRU antenna model. Ex. 1005 ¶¶ 9, 77. Petitioner identifies in Xi’s Figure 2 multiple antenna panels (“Mg” antenna panels per column and “Ng antenna panels per row”), with the panels in the first row annotated in red. Pet. 21–22 (citing Ex. 1005 ¶ 0077; Ex. 1008 ¶¶ 73–74; Ex. 1003 ¶ 55). Patent Owner does not present argument to the contrary. We are sufficiently persuaded that Xi discloses “a plurality of antenna panels.”

c) Limitation [1.2]

Claim 1 recites “a processor coupled to the plurality of antenna panels and configured to.” Ex. 1001, 31:10–11. Petitioner cites to paragraphs 34, 35, and 37 of Xi. Pet. 22. Xi describes that a WTRU includes processor 118, transceiver 120, and transmit/receive element 122. Ex. 1005 ¶ 34. Xi describes that processor 118 can be integrated with transceiver 120. *Id.* ¶ 35. Xi describes that transceiver 120 is coupled to transmit/receive element 122. *Id.* Xi also describes that WTRU may include any number of transmit/receive elements 122, and that transmit/receive elements 122 are antennas. *Id.* ¶ 37. Petitioner explains that Xi’s discloses multiple antennas which are organized into multiple antenna panels. Pet. 23 (citing Ex. 1005, Fig. 2). On the basis of the foregoing, Petitioner asserts that Xi “discloses or

renders obvious” a processor coupled to the plurality of antenna panels. *Id.* (citing Ex. 1003 ¶ 57).

Petitioner’s assertions are supported by the cited evidence. Patent Owner does not present argument to the contrary. We are sufficiently persuaded that Xi both discloses and reasonably would have suggested limitation [1.2].

d) Limitation [1.3]

Claim 1 recites “[processor is configured to] maintain a plurality of leading time values, the plurality of leading time values indicating a plurality of leading time durations.” Ex. 1001, 31:12–14. As explained above in Section III.B.2, we construe “leading time value” and “leading time duration” as a value or duration that can be met by “the time required for a mobile station with at least one antenna panel to switch beams after receiving a beam switch command.”

Petitioner asserts that Xi’s “threshold K,” which we discussed above in Section III.C.1, is a “leading time value” indicating a “leading time duration.” Pet. 23 (citing Ex. 1003 ¶¶ 58–60). Petitioner explains:

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].

Id. Because we construe “leading time value” and “leading time duration” as a value or duration that can be met by “the time required for a mobile station with at least one antenna panel to switch beams after receiving a beam switch command,” as explained above in Section III.B.2, we agree

with Petitioner that Xi's "threshold K" is a "leading time value" indicating a "leading time duration." Patent Owner does not dispute that Xi's "threshold K" is an estimated time duration that Xi's WTRU needs to perform beam switching after receiving a beam switch command. The above-quoted text from Xi clearly discloses that Xi's "threshold K" may be an estimated time duration that the WTRU needs to finish beam switching from a current Rx beam to a new Rx beam, and that Xi's "threshold K" may also be a value of estimated time duration for a WTRU performing beam switching, if a new Rx beam is needed.

Petitioner asserts that Xi's WTRU maintains multiple values of threshold K. Pet. 24 (citing Ex. 1005 ¶ 92). Petitioner also asserts that Xi explains that 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." *Id.* (citing Ex. 1005 ¶ 90). In summary, Petitioner explains:

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.

Id. ¶ 25.

Petitioner's assertions are supported by the cited evidence. Patent Owner does not present arguments disputing that Xi's "threshold K" is the estimated time or duration for performing beam switching in Xi.

Instead, Patent Owner argues:

Even though Xi provides a laundry list of the items that the **threshold K** may represent, as patent references often do, these are only estimates of time durations and there is no indication in Xi that these estimates are specific to the plurality of antenna panels of the device. (Ex. 1005, [0084]-[0095].) Importantly, the estimates are not related to the value/duration for **switching the status of the plurality of antenna panels of the device**. Consequently, Xi does not disclose maintaining a plurality of such leading time values/durations for the given device.

Prelim. Resp. 10. The arguments are unavailing. Although there is no express statement in Xi that the “threshold K” values are estimate durations for changing the status of antenna panels, Petitioner explains why Xi’s beam indicator is an indicator for antenna panel status information and that beam switching implies changing antenna panel status to that required by the new beam. Pet. 26–27. On that basis, because “threshold K” values of Xi are estimates of the time durations for performing beam switching, they also are estimates of the time durations for switching the status of the antenna panels of the WTRU, are specific to the antenna panels of the WTRU, and are “related to the value/duration for switching the status of the plurality of antenna panels of the device.” We reproduce Petitioner’s explanation here:

Xi’s beam indicator (conveyed vi 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 building 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. 10-15, 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 used 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.

Pet. 26–27. As we already noted above in Section III.B.1, Patent Owner has not presented persuasive argument to undermine Petitioner’s reasoning.

Patent Owner asserts that “[e]ven if the TCI implies beam selection, this is not an indicator from the BS that instructs the device to switch the status of the plurality of antenna panels, as required by the claims.” Prelim. Resp. 13. Patent Owner, however, has not provided explanation on why Petitioner’s reasoning is wrong that because new beam selection implicitly changes antenna panel status to one that corresponds to the new beam, a beam indicator is an indicator of antenna panel status information. On this record,

Petitioner persuasively explains that beam switching implicitly calls for changing or modifying antenna panel status from the present antenna panel status to that required by the new beam.

Patent Owner's assertion (Prelim. Resp. 10) that Xi provides only an estimate of the time durations is also unavailing. Patent Owner provides no explanation why estimates of the time durations required for switching antenna panel status are not sufficient to meet the requirements of "leading time values" and "leading time durations." Indeed, the exact time duration for each change is not known until the change in antenna panel status has been made. Limitation [1.5], discussed below, further recites: "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" (emphasis added). Thus, the leading time values are already determined prior to actual switching of antenna panel status. On this record, our view is that Xi's teaching is sufficient.

For the foregoing reasons, we are sufficiently persuaded that Xi both discloses and reasonably would have suggested limitation [1.3].

e) Limitation [1.4]

Claim 1 recites: "[processor configured to] receive an indicator for antenna panel status information from a base station (BS)." Ex. 1001, 31:15–16. As determined above in Section III.B.1., "an indicator for antenna panel status information" is construed to mean—"any *implicit or explicit indication of how many, or which, antenna panels are turned on or off—*." Petitioner asserts that "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.*’” Pet. 27.

Petitioner explains:

Xi discloses downlink control information (DCI) received by a WTRU that includes a Transmission Configuration Indicator (TCI) for scheduling the PDSCH. Ex. 2005, [00874] (“[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.

Pet. 25–26.

As explained above in the context of limitation [1.3], 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. Also as explained above in the context of limitation [1.3], a person of ordinary skill in the art would have understood that a TCI beam indicator communicated to a multi-panel WTRU implicitly indicates a particular antenna panel to use or turn on. We agree with Petitioner, on this record, that an indication of a specific beam is an implicit indication of a specific antenna panel or panels in Xi’s multi-panel WTRU.

In the alternative, Petitioner asserts that Xi’s disclosure would have suggested to one with ordinary skill in the art 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". *Id.* at 27. Petitioner explains:

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 Ex. 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.

Id. at 27.

Petitioner's assertions are supported by the cited evidence. Patent Owner does not present arguments addressing Petitioner's position that Xi's beam indicator implicitly indicates or specifies which antenna panel(s) in Xi's WTRU are to be used or turned on. Patent Owner argues: "Even if the TCI implies beam selection, this is not an indicator from the BS that instructs the device to switch the status of the plurality of antenna panels, as required by the claims." But Patent Owner does not explain why that is not so, such as by identifying a deficiency in Petitioner's reasoning that beam selection implies indicating the antenna panel(s) to be turned on or off in switching to the new beam.

Although Petitioner's reasoning is based on implied rather than express disclosure of Xi, a prior art reference need not use the same words as the claims to which the reference is applied. *In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009). The pertinent inquiry takes into account the literal teachings of the prior art reference, and inferences the ordinarily skilled

person would draw from it. *Eli Lilly & Co. v. L.A. Biomedical Res. Inst. at Harbor-UCLA Med. Ctr.*, 849 F.3d 1073, 1074–75 (Fed. Cir. 2017).

The dispositive question is whether one with ordinary skill in the art would have reasonably understood or inferred from the prior art reference the limitation at issue. *See In re Baxter Travenol Labs.*, 952 F.2d 388, 390 (Fed. Cir. 1991); *In re Preda*, 401 F.2d 825, 826–27 (CCPA 1968) (“[I]n considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference, but also the inferences which one skilled in the art would reasonably be expected to draw therefrom.”).

We are sufficiently persuaded that Xi discloses and also reasonably would have suggested limitation [1.4] to one of ordinary skill in the art.

f) Limitation [1.5]

Claim 1 recites: “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.” Ex. 1001, 31:17–20.

Petitioner asserts that Xi would have suggested limitation [1.5] to one of ordinary skill in the art because Xi

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*).

Pet. 28. More specifically, Petitioner asserts:

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).

Id. (citing Ex. 1003 ¶ 77). Petitioner notes (1) in connection with limitation [1.4], it has explained how Xi describes that a WTRU receives a beam indication that implicitly indicates which antenna panel to use (indicator for antenna panel; status information), and (2) in connection with limitation [1.3], it has explained how Xi discloses that threshold K (leading time value) is selected or determined by a WTRU and that the threshold K depends on WTRU processing time for beam switching and the number of panels equipped and used simultaneously or non-simultaneously. *Id.* at 28–29.

Petitioner’s position is that because Xi recognizes that the time to implement an indicated beam depends on whether a beam indication indicates whether a different beam is needed, and because the value used for threshold K depends on the processing time for beam switching and antenna panel usage, Xi would have suggested to one of ordinary skill in the art: “for a WTRU to apply a different value of threshold K based on processing time for beam switching if a beam switch involves switching between antenna panels or changing which panels are in use.” *Id.* at 29 (citing Ex. 1003 ¶ 79). Petitioner further explains that if the scheduling offset value is less than the threshold K (leading time value) determined to be applied, then the WTRU would not implement an indicated beam but would choose an otherwise “suitable Rx beam.” *Id.* at 30.

Notwithstanding Patent Owner’s arguments to the contrary, as discussed below, Petitioner’s assertions are rational and supported by the cited evidence. Patent Owner argues:

Xi's threshold K may represent estimates of time durations, but there is no indication in Xi that these estimates are specific to the plurality of antenna panels of the device, and, consequently, are not the same as the claimed leading time value/duration for *switching the status of the plurality of antenna panels*.

Prelim. Resp. 12. We already addressed these arguments above in the context of limitation [1.3]. They are unavailing. Although there is no express statement in Xi that the “threshold K” values are estimate durations for changing the status of antenna panels, Petitioner explains why Xi's beam indicator is an indicator for antenna panel status information and that beam switching implies changing antenna panel status to that required by the new beam. Pet. 26–27. Because “threshold K” values of Xi are estimates of the time durations for performing beam switching, they also are estimates of the time durations for switching the status of the antenna panels of the WTRU, are specific to the antenna panels of the WTRU, and are values/durations for switching the status of the plurality of antenna panels of the device.

Patent Owner also argues that “[e]ven if TCI implies beam selection, this is not an indicator from the BS that instructs the device to switch the status of the plurality of antenna panels, as required by the claims.” Prelim. Resp. 13. We already addressed this argument above in Section III.B.2. when discussing construction of the claim terms “leading time value” and “leading time duration,” and also above in the context of discussing limitation [1.3] and [1.4]. It is unavailing. Patent Owner does not explain why Petitioner is wrong that beam selection implies indicating the antenna panel(s) to be turned on or off in switching to the new beam, or why Petitioner is wrong that because new beam selection implicitly changes antenna panel status to one that corresponds to the new beam, a beam indicator is an indicator of antenna panel status information.

Finally, Patent Owner argues that Xi does not disclose using “threshold K” to determine whether to switch the operating status of any antenna panel, let alone whether to switch the antenna panels’ status based on the indicator for antenna panel status from the BS (base station). Prelim. Resp. 13. Also, Patent Owner asserts that Xi does not use any “threshold K” as a basis for switching the status of any of the antenna panels. *Id.*

These arguments are unavailing, because they do not account for Petitioner’s explanations, set forth and discussed above, on why Xi’s WTRU selects and applies one of the available values of the threshold K to determine whether to switch to the antenna panel(s) implicitly indicated by the beam indicator which serves as an indicator for antenna panel status information. Petitioner’s explanations reasonably convey that a “threshold K” is used as a basis for switching the status of the WTRU’s antenna panels based on an indicator for antenna panel status information.

We are sufficiently persuaded that Xi reasonably would have suggested limitation [1.5] to one of ordinary skill in the art.

g) Limitation [1.6]

Claim 1 recites: “[processor is configured to] 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.” Ex. 1001, 31:21–24. Petitioner asserts that because Xi’s DCI message, received from a base station, includes a scheduling offset value for receiving a PDSCH (a downlink (DL) channel), Xi discloses or would have suggested limitation [1.6]. Pet. 31.

Petitioner asserts that because limitation [1.6] is written in the form of “at least one of,” a prior art reference need only satisfy one of the two

recited conditions, i.e., the scheduling offset value has a K0 parameter for a Downlink (DL) channel or a K2 parameter for an Uplink (UL) channel. *Id.* at 31 n.2. Patent Owner does not argue otherwise and we have no reason to disagree. Petitioner explains that in the context of the specification of the '972 patent, "K0 parameter" "is a generic name given to the scheduling offset value for a downlink channel, such as PDSCH." *Id.* at 31 (citing Ex. 1001, 17:50–52; Ex. 1003 ¶ 82). Patent Owner does not argue otherwise and we have no reason to disagree.

Petitioner explains that an example of a "K0 parameter" in the specification of the '972 patent is a scheduling offset for PDSCH reception, "which is what Xi discloses." *Id.* at 32 (citing Ex. 1001, 20:67–21:3; Ex. 1003 ¶ 82). Petitioner's assertion is supported by the cited evidence and Patent Owner does not present argument to the contrary.

We are sufficiently persuaded that Xi discloses and also reasonably would have suggested limitation [1.6].

h) Limitation [1.7]

Claim 1 recites: "[processor is configured to] 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. 1001, 31:25–28. As already discussed above in the context of limitation [1.3], Xi's "threshold K" satisfies the recited "leading time value" and "leading time duration."

Petitioner cites to the following description of Xi:

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 ¶ 109. Petitioner explains: “Xi teaches that if the scheduling offset value is less than the time required for beam switching (threshold K), then WTRU cannot use the beam indicated by the DCI, so some other ‘suitable Rx beam’ may be applied.” Pet 32 (citing Ex. 1005 ¶ 109).

Petitioner further explains:

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.

Id. at 33 (citing Ex. 1003 ¶ 85) (footnote omitted). Petitioner additionally notes that Xi provides several alternatives for selecting a “suitable Rx beam” that does not involve switching to the beam indicated in the DCI. *Id.* (citing Ex. 1005 ¶¶ 110, 113; Ex. 1003 ¶ 87). For the foregoing reasons, Petitioner asserts that “Xi renders obvious claim element [1.7].” *Id.* at 34.

Petitioner’s assertions are supported by the cited evidence. Patent Owner does not present arguments additional to those it presents for limitations [1.3] and [1.5], which we have already discussed and found unavailing above. We are sufficiently persuaded that Xi reasonably would have suggested limitation [1.7].

i) Claimed Invention as a Whole

Patent Owner argues that “Petitioner repeatedly argues that each of the limitations [of claim 1] are ‘obvious,’ but never explains how the invention ‘as a whole is obvious.’” We agree with Patent Owner that an obviousness determination is based on assessment of the claimed invention as a whole. But, notwithstanding that, there still is a proper place in an

obviousness determination for addressing whether one or more claim limitations reasonably would have been suggested by a prior art reference.

What is inappropriate is attempting to meet obviousness by finding all of the claimed features in disparate systems or environments and not explaining how to put them all together to meet the claim as a whole. This is, however, not what Petitioner has done. Rather, Petitioner determined the scope and content of Xi (Pet. 15–20), identified all the differences between Xi and the claimed invention (*id.* at 20–34), and explained how each difference would have been made up or cured by what reasonably would have been suggested by Xi to one of ordinary skill in the art (*id.*). Petitioner also identified the level of ordinary skill in the art (*id.* at 9–10). On the basis of all of that, Petitioner summarizes or concludes, in a caption, the claimed invention would have been obvious to one of ordinary skill in the art over Xi. Pet. 15 (“Claims 1, 2, 9–12, 14, 15, 16, 23–26, and 28 are obvious under 35 U.S.C. § 103 over Xi”). We see nothing wrong with this approach to determining obviousness of each claimed invention as a whole.⁷

Patent Owner asserts that Petitioner did not identify differences between the claimed invention and the prior art. Prelim. Resp. 14. We disagree. In each instance where, according to Petitioner, a claim limitation is disclosed by Xi, Petitioner has asserted that Xi discloses the limitation (Pet. 20–34). In each instance where Petitioner has not asserted that Xi

⁷ Although it might have been better if Petitioner additionally stated its summary and conclusion in the body of the petition near where each claim is analyzed, Petitioner’s not doing so does not impact its showing. We understand Petitioner as saying that each difference between Xi’s disclosure and the subject matter claimed would have been made up by what reasonably would have been suggested by the applied prior art including Xi.

discloses the limitation but only asserts Xi would have suggested the feature, a difference with respect to Xi has been specifically identified. Patent Owner appears to be insisting on a particular manner, formalistically, of identifying differences between the claimed invention and the prior art. We know of no such requirement and Patent Owner has cited no authority in that regard.

Patent Owner states: “Because Petitioner did not identify the differences between the claimed invention and the prior art, Petitioner has not shown why one skilled in the art would modify Xi in view of the deficiencies thereof ‘to arrive at the claimed invention.’” Prelim. Resp. 14. The argument is without merit because Petitioner has identified differences between the claimed invention and Xi’s disclosure. Further, Petitioner’s accounting for why Xi reasonably would have suggested the limitations that Xi does not expressly disclose is a showing of why one of ordinary skill in the art would have arrived at the claimed invention based on Xi’s disclosure.

j) Conclusion

We have considered all of the arguments and evidence before us. Petitioner has shown a reasonable likelihood that it would prevail in establishing obviousness of claim 1 over Xi.

3. Dependent Claims 2, 9–12, and 14

Claims 2, 9–12, and 14 each depend directly from claim 1. Ex. 1001, 31:29–34, 32:14–38, 32:52–64. Petitioner specifically addresses all of them. Pet. 32–47. Patent Owner does not present any argument additional to those it presents for claim 1, including the “obviousness of the claim as a whole” argument, all which we have determined above as unavailing. Petitioner’s

assertions for claims 2, 9–12, and 14 are rational and supported by the cited evidence. We specifically address claim 2 in detail.

Claim 2 additionally recites: “wherein the processor is further configured to: receive a timer from the BS; and switch the antenna panel status from a first antenna panel status to a second antenna panel status after the panel expires.” Ex. 1001, 31:29–34.

Petitioner asserts that Xi describes that a WTRU may use a beam for a given amount of time, indicated by a timer, which is configured with each special QCL assumption, so that the beam does not need to be indicated for every PDSCH. Pet. 34 (citing Ex. 1005 ¶ 112). Specifically, Xi states: “timer [may be] configured with each special QCL assumption,” and “spatial QCL assumption may be indicated to the WTRU using DCI or TCI.” Ex. 1005 ¶ 112. Petitioner explains that “DCI” and “TCI” are control information transmitted by a base station (BS) and received by a WTRU. Pet. 35 (citing Ex. 1003 ¶¶ 48, 89–90). On the basis of the foregoing, Petition asserts that “Xi discloses a WTRU (having a processor) receiving a timer via a ‘DCI’ or ‘TCI’ or other messages from a BS, wherein a beam is used until the timer expires,” and thus Xi reasonably would have suggested a processor configured to “receive a timer from the BS.” *Id.* (citing Ex. 1003 ¶ 91).

Petitioner also asserts that, as discussed in connection with limitation [1.4], a beam indication transmitted to Xi’s MTRU would have explicitly or implicitly indicated one or more antenna panels to use, and thus in “receiving a PDSCH using a beam indicated b DCI/TCI, Xi’s multi-panel WTRU would have had ‘a first antenna panel status.’” Pet. 35 (citing Ex. 1003 ¶ 92). Petitioner asserts Xi discloses that “spatial QCL

assumption” is equivalent to indicating a beam, and that when a timer expires, a “new spatial QCL assumption” may be used to “overwrite the old spatial QCL assumption.” *Id.* at 35–36 (citing Ex. 1005 ¶¶ 109, 112).

Accordingly, Petitioner asserts:

[W]hen 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.*”

Id. at 36.

Petitioner’s assertions are rational and supported by the cited evidence. On this record, we are sufficiently persuaded that Xi discloses and also reasonably would have suggested the limitation added by claim 2. Petitioner also has not treated all features of claim 2, including those incorporated from independent claim 1, as separate elements unrelated to each other and has reasonably concluded that claim 2 as a whole would have been obvious over Xi. Patent Owner’s “obviousness of the claim as a whole” argument for claim 2 is just as unavailing for claim 2 as it is for claim 1, for the same reasons discussed above in the context of claim 1.

Likewise, for the reasons explained by Petitioner, we are sufficiently persuaded (1) that the limitation added by claim 9 reasonably would have been suggested by Xi, (2) that Xi discloses and also reasonably would have suggested the limitation added by claim 10, (3) that the limitation added by claim 11 reasonably would have been suggested by Xi, (4) that the limitation added by claim 12 reasonably would have been suggested by Xi, and (5) that the limitation added by claim 14 reasonably would have been suggested by Xi. Petitioner also has not treated all features of these dependent claims, including those incorporated from independent claim 1, as separate elements

unrelated to each other and has reasonably concluded that each claim as a whole would have been obvious over Xi. Patent Owner's "obviousness of the claim as a whole" argument for claims 9–12 and 14 is just as unavailing for these claims as it is for claim 1, for the same reasons discussed above in the context of claim 1.

For the foregoing reasons, Petitioner has shown a reasonable likelihood that it would prevail in establishing obviousness of claim 2, 9–12, and 14 over Xi.

4. *Independent Claim 15*

Claim 15 is essentially the same as claim 1, except that claim 15 is in method form and includes as method steps the various functions performed by the processor recited in claim 1. Ex. 1001, 32:65–33:17. Petitioner relies on the same analysis it provides for claim 1. Pet. 47–48. Patent Owner does not provide arguments separate from those it has provided for claim 1 and already discussed above in the context of claim 1.

Petitioner has shown a reasonable likelihood that it would prevail in establishing obviousness of claim 15 over Xi.

5. *Dependent Claims 16, 23–26, and 28*

Claims 16, 23–26, and 28 each depend directly from claim 15. Ex. 1001, 33:18–22, 34:8–31, 34:44–54. Petitioner addresses each of these claims. Pet. 48–50. For claim 16, Petitioner provides the same analysis as it provides for claim 2. *Id.* at 48. For claim 23, Petitioner provides the same analysis as it provides for claim 9. *Id.* at 48–49. For claim 24, Petitioner provides the same analysis as it provides for claim 10. *Id.* at 49. For claim 25, Petitioner provides the same analysis as it provides for claim 11. *Id.* at 49. For claim 26, Petitioner provides the same analysis as it provides for

claim 12. *Id.* at 49–50. For claim 28, Petitioner provides the same analysis as it provides for claim 14. *Id.* at 50. Patent Owner does not provide arguments separate from those it has provided for claims 1 and 15, including the “obviousness of the claim as a whole” argument, all which we have determined above in the context of claims 1 and 15 as unavailing.

Petitioner has not left treated features of these dependent claims, including those incorporated from independent claim 1, as separate elements unrelated to each other and has reasonably concluded that each claim as a whole would have been obvious over Xi. Patent Owner’s “obviousness of the claim as a whole” argument for these claims is just as unavailing for these claims as it is for claims 1 and 15, for the same reasons discussed above in the context of claims 1 and 15.

We find, on this record, that Petitioner’s assertions for claims 16, 23–26, and 28 are supported by the cited evidence. Petitioner has shown a reasonable likelihood that it would prevail in establishing obviousness of claims 16, 23–26, and 28 over Xi.

D. Alleged Obviousness of Claims 8, 13, 22, and 27 over Xi and Deenoo

1. Overview of Deenoo

Deenoo discloses a method for jointly performing beam management and power management in a wireless transmit/receive unit (WTRU), where the WTRU is configured to operate according to a plurality of power states, and a plurality of beam management states that are linked to the power states, such that each power state corresponds to a different beam management state. Ex. 1006, code (57). In that regard, Deenoo describes:

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 (e.g., network capabilities, WTRU capabilities, and communication environments, such as channel quality, available bandwidth, single beam transmission, multi-beam transmission, etc.) and use cases, and may further be adapted on a dynamic basis as conditions and use cases change.

Id. ¶ 101. Deenoo also states: “A potential conflict may arise if DRX management and beam management are optimized separately.” *Id.* ¶ 0006. Deenoo further states: “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.” *Id.* ¶ 93.

For joint beam and power management, Deenoo describes:

[A] set of power savings states (e.g., different levels of layer 1 (L1) and layer 2 (L2) processing and/or RF configuration) 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.

Id. ¶ 147.

2. *Dependent Claims 8 and 22*

Claims 8 depends from claim 1 and claim 22 depends from claim 15.

Ex. 1001, 32:1–13, 33:51–34:7. Relative to claim 1, claim 8 further recites:⁸

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

⁸ The bracketed captions correspond to those used by Petitioner to reference the claim elements. *See* Pet. 55. We use them here for ease of reference, understanding, and consistency.

[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.

Id. at 32:2–13. Claim 22, relative to claim 15, essentially adds the same, albeit in method step format. *Id.* at 33:51–34:7.

With respect to limitation [8.1] and corresponding feature in claim 22, Petitioner asserts that as discussed in connection with limitation [1.4], Xi discloses a TCI state field that provides a beam indication that is represented by N bits. Pet. 55. Petitioner asserts that the range of N encompasses one bit, thereby disclosing or rendering obvious “wherein the indicator for antenna panel status information comprises a single-bit Information Element (IE).” *Id.* (citing Ex. 1003 ¶¶ 148–149).

We do not agree that a broad encompassing term such as “N bits” specifically discloses “single bit.” Petitioner does not identify what Xi describes as “N.” However, the rest of Petitioner’s assertions are supported by the cited evidence. Patent Owner does not present counter-argument in that regard. We are sufficiently persuaded that Xi reasonably would have suggested limitation [8.1].

Petitioner asserts that limitation [8.2] and corresponding feature in claim 22, would have been suggested by Xi alone or by Xi in combination with Deenoo. *Id.* Petitioner explains, based on Xi alone:

It would have been obvious to a POSITA [person of ordinary skill in the art] 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 different numbers of antenna panels) may be used to generate the different beamforming gains.

Id. (citing Ex. 1003 ¶ 151). Petitioner also cites to Deenoo as showing what one of ordinary skill in the art would have understood, that a large number of antenna elements may be used to achieve a higher beamforming gain. *Id.* at 55–56 (citing Ex. 1006 ¶ 91). Petitioner asserts that one of ordinary skill in the art would have understood that a higher beamforming gain is achieved at the expense of increased power consumption. *Id.* at 56 (citing Ex. 1003 ¶ 152; Ex. 1006 ¶ 176).

Petitioner further explains that Xi discloses that its WTRU operates in different modes to provide power savings, for example, a “baseline mode” for “saving energy.” *Id.* (citing Ex. 1005 ¶ 100). Petitioner refers to this baseline mode of Xi for saving energy as a “power saving mode.” *Id.*

Petitioner concludes:

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 [how claim 8 recites the processor is configured, i.e., “enable ... disable ... wherein ...”].

Id. (citing Ex. 1003 ¶ 152).

Petitioner’s assertions are supported by the cited evidence. Patent Owner does not present a counter-argument in that regard. We are sufficiently persuaded that Xi alone reasonably would have suggested limitation [8.2] and the corresponding feature in claim 22.

Petitioner further asserts that the combined teachings of Xi and Deenoo reasonably would have suggested limitation [8.2] and the corresponding feature in claim 22. Pet. 56–57. Petitioner explains that (1) Deenoo describes coordinated control of power management and beam management, via a linking between power saving states and beam management states, and (2) there are a variety of potential parameters related to Deenoo’s beam management procedures, including properties or characteristics of a beam. *Id.* (citing Ex. 1003 ¶¶ 154–156; Ex. 1006 ¶¶ 113–118, 147, 156, 174). Petitioner concludes:

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.

Id. at 57.

Regarding motivation to combine teachings of Xi and Deenoo, Petitioner explains that in Deenoo, power management states and beam management states can be linked or associated, such as through an implicit relationship. Pet. 53 (citing Ex. 1006 ¶ 7). Petitioner asserts that when combined with Deenoo’s teachings, Xi’s beam indicator can also indicate

power management state, via an implicit relationship. *Id.* at 54 (citing Ex. 1006 ¶ 183). Petitioner explains:

Linking beam management states (such as those present 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 present 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.

Id. As noted above, we find Petitioner's reasoning to have rational underpinnings. Patent Owner does not present a counter-argument in that regard. We are sufficiently persuaded that Xi and Deenoo in combination reasonably would have suggested limitation [8.2] and the corresponding feature in claim 22.

For claims 8 and 22, Patent Owner does not provide arguments separate from those it has provided for claims 1 and 15, including the "obviousness of the claim as a whole" argument, all which we have determined above in the context of claims 1 and 15 as unavailing.

Petitioner has not treated all features of dependent claims 8 and 22, including those incorporated from independent claim 1, as separate elements unrelated to each other and has reasonably concluded that each of claims 8 and 22 as a whole would have been obvious over Xi and Deenoo. Patent

Owner’s “obviousness of the claim as a whole” argument for claims 8 and 22 is just as unavailing for claims 8 and 22 as it is for claims 1 and 15, for the same reasons discussed above in the context of claims 1 and 15.

Petitioner has shown a reasonable likelihood that it would prevail in establishing obviousness of claims 8 and 22 over Xi and Deenoo.⁹

3. *Dependent Claims 13 and 27*

Claims 13 depends from claim 1 and claim 27 depends from claim 15. Ex. 1001, 32:39–51, 34:32–43. Relative to claim 1, claim 13 further recites:¹⁰

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,

[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.

Id. at 32:39–51. Claim 27, relative to claim 15, essentially adds the same, albeit in method step format. *Id.* at 34:32–43.

With respect to limitation [13.1] and corresponding feature in claim 27, Petitioner asserts that Xi and Deenoo in combination discloses it. Pet.

⁹ Encompassed within this ground of obviousness over Xi and Deenoo, as presented by Petitioner, is alleged obviousness over Xi alone.

¹⁰ The bracketed captions correspond to those used by Petitioner to reference the claim elements. *See* Pet. 58–59. We use them here for ease of reference, understanding, and consistency.

58. Specifically, Petitioner asserts that Xi teaches that a WTRU dynamically switches operation modes for saving energy, and that Deenoo discloses sending a DRX command to a WTRU to transition from a non-DRX state (an example of “DRX inactive time”) to a DRX state (an example of “DRX active time”). *Id.* (citing Ex. 1005 ¶ 100; Ex. 1006 ¶ 189). Petitioner notes that Deenoo states the following about “DRX”: “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.” *Id.* at 51 n.6 (citing Ex. 1006 ¶ 93). Petitioner also notes that Deenoo discloses that a set of power saving states may be linked or mapped with beam management states “such that a transition between two states at the power savings procedure may induce similar transition at the beam management level, and vice-versa.” *Id.* at 59 (citing Ex. 1006 ¶ 174).

Petitioner explains:

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.*”

Id. (citing Ex. 1003 ¶ 162). Petitioner’s reasoning for combining the teachings of Xi and Deenoo has been discussed in the context of claim 8.

Petitioner’s assertions are supported by the cited evidence. Patent Owner does not present a counter-argument in that regard. We are sufficiently persuaded that Xi and Deenoo in combination discloses limitation [13.1] and the corresponding feature in claim 27.

With respect to limitation [13.2] and corresponding feature in claim 27, Petitioner asserts that Xi and Deenoo in combination

discloses it. Pet. 59–61. Petitioner asserts (1) that Deenoo’s DRX command triggers an associated change in power state, and that a power state may reflect the RF configuration, (2) that according to Xi, RF configuration was understood as reflecting the number of antenna panels, and (3) that one objective of DRX was to save power. Pet. 59–60 (citing Ex. 1005 ¶ 90; Ex. 1006 ¶¶ 5, 174). Petitioner also asserts it was well known to one of ordinary skill in the art that higher beamforming gain in a WTRU is achieved at the expense of increased WTRU power consumption such as through use of an increased number of antenna elements. *Id.* at 60 (citing Ex. 1003 ¶ 164).

Petitioner explains:

Thus, it would have been understood or obvious to a POSITA [one of ordinary skill in the art] 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).

Id. On the basis of the foregoing, Petitioner concludes:

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.

Id. at 61.

Petitioner’s assertions are supported by the cited evidence. Patent Owner does not present a counter-argument in that regard. We are sufficiently persuaded that Xi and Deenoo in combination discloses limitation [13.2] and the corresponding feature in claim 27.

For claims 13 and 27, Patent Owner does not provide arguments separate from those it has provided for claims 1 and 15, including the “obviousness of the claim as a whole” argument, all which we have determined above in the context of claims 1 and 15 as unavailing.

Petitioner has not treated all features of dependent claims 13 and 27, including those incorporated from independent claim 1, as separate elements unrelated to each other and has reasonably concluded that each of claims 13 and 27 as a whole would have been obvious over Xi and Deenoo. Patent Owner’s “obviousness of the claim as a whole” argument for claims 13 and 27 is just as unavailing for claims 13 and 27 as it is for claims 1 and 15, for the same reasons discussed above in the context of claims 1 and 15.

Petitioner has shown a reasonable likelihood that it would prevail in establishing obviousness of claims 13 and 27 over Xi and Deenoo.

IV. CONCLUSION

For the foregoing reasons, we conclude that the information presented in the Petition and Preliminary Response establishes a reasonable likelihood that Petitioner would prevail in showing that claims 1, 2, 8–16, and 22–28 of the ’972 patent are unpatentable.

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that *inter partes* review of all challenged claims, i.e., claims 1, 2, 8–16, and 22–28 of the ’972 patent, is hereby instituted on all grounds stated in the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial; the trial will commence on the entry date of this decision.

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