

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

APEX BEAM TECHNOLOGIES LLC,
Patent Owner.

IPR2025-00895
Patent 10,568,113 B2

Before KEVIN W. CHERRY, JOHN D. HAMANN, and
SCOTT RAEVSKY, *Administrative Patent Judges*.

RAEVSKY, *Administrative Patent Judge*.

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

I. INTRODUCTION

Apple Inc. (“Petitioner”) filed a Petition (Paper 3, “Pet.”) requesting *inter partes* review of claims 1–20 of U.S. Patent No. 10,568,113 B2 (Ex. 1001, “the ’113 patent”). Pet. 1. Apex Beam Technologies LLC (“Patent Owner”) filed a Preliminary Response (Paper 10, “Prelim. Resp.”). Patent Owner’s request for discretionary denial was denied and the Petition was forwarded to the Board. Paper 11.

After considering the parties’ arguments and evidence, and for the reasons set forth below, Petitioner demonstrates a reasonable likelihood of prevailing with respect to at least one of the challenged claims of the ’113 patent. *See* 35 U.S.C. § 314(a). Accordingly, we institute an *inter partes* review with respect to all challenged claims and challenges asserted in the Petition. 37 C.F.R. § 42.108(a).

Our factual findings and conclusions at this stage of the proceeding are based on the evidentiary record developed thus far. This is not a final decision as to patentability of the challenged claims.

II. BACKGROUND

A. Related Matters

The Petition includes similar grounds as a petition filed by Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc., IPR2023-00601 (“the Samsung IPR”). The Samsung IPR proceeded to oral hearing and settled shortly thereafter. *See* IPR2023-00601, Papers 28, 31. Thus, the Board did not issue a Final Written Decision in the Samsung IPR.

The parties identify additional related matters in their respective papers. Pet. 95–96; Paper. 5, 2.

B. Real Parties-in-Interest

Apple Inc. identifies itself as the only real party-in-interest (RPI).
Pet. 95. Patent Owner identifies itself as the sole RPI. Paper 5, 2.

C. The '113 patent

The '113 patent describes transmission schemes for radio signals by a User Equipment (UE) in a massive Multi-Input Multi-Output (MIMO) system. Ex. 1001, 1:17–27. In massive MIMO, multiple antennas use beamforming to form a relatively narrow beam, which points in a particular direction to improve the quality of communication. *Id.* at 1:27–30. When the quality of this beam is degraded, the UE can transmit a beam recovery request to a base station, which then changes the beam. *Id.* at 1:34–39. If the UE, after transmitting a beam recovery request during a time window, cannot transmit the request again during the time window, this results in low utilization of time-frequency resources. *Id.* at 1:43–52.

One disclosed solution involves the steps shown in the Figure 1:

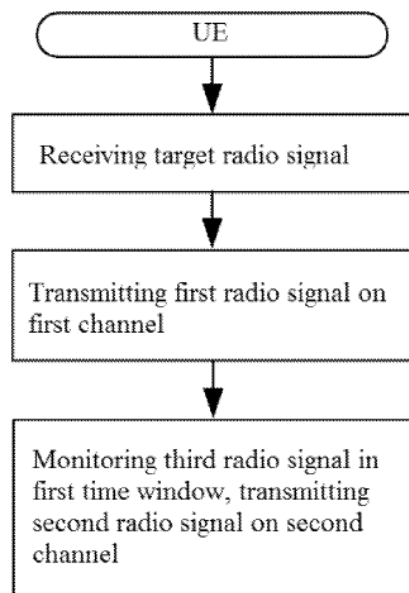


FIG. 1

Id. at 1:60–67, 13:45–56. In Figure 1, a UE receives a target radio signal, transmits a first radio signal on a first channel, monitors a third radio signal in a first time window, and transmits a second radio signal on a second channel, in sequence. *Id.* at 13:45–50. A measurement for the target radio signal is used for triggering the transmission of the first radio signal and the second radio signal. *Id.* at 13:50–52. A time resource occupied by the first radio signal is used for determining the start time of the first time window, and a time resource occupied by the second radio signal is used for determining the end time of the first time window. *Id.* at 13:53–56.

Figure 6 below illustrates an example of a first time window, a second time window, and third time window.

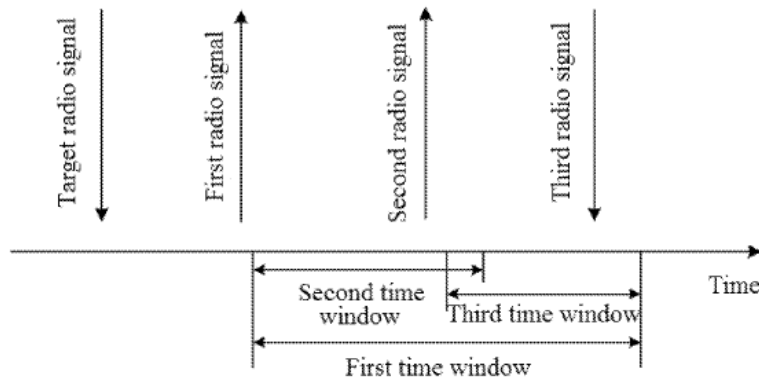


FIG.6

Id. at 22:44–61. In Figure 6, a time domain resource occupied by a first radio signal is used for determining the start time of a second time window, and a time domain resource occupied by a second radio signal is used for determining the start time of a third time window. *Id.* The start time of the first time window and the start time of the second time window are the same. *Id.* The time domain resource occupied by the second radio signal is within

the second time window. *Id.* The end time of the first time window and the end time of the third time window are the same. *Id.* The UE conducts monitoring of the third radio signal in a time interval between the start time of the first time window and the time domain resource occupied by the second radio signal, but does not detect the third radio signal. *Id.* The third radio signal is transmitted after the second radio signal. *Id.*

D. Challenged Claims

Claim 1, below, is illustrative of the challenged claims. Petitioner's claim element labels are included for reference.

1. A method in a User Equipment (UE) for wireless communication, comprising:

[1a] receiving a target radio signal;

[1b] transmitting a first radio signal on a first channel;

[1c] transmitting a second radio signal on a second channel; and

[1d] monitoring a third radio signal in a first time window;

[1e] wherein a measurement for the target radio signal obtains a target measurement value, the target measurement value, when higher than a

target threshold is used for triggering the transmission of the first radio signal and the second radio signal;

[1f] a time resource occupied by the first radio signal is used for determining the start time of the first time window;

[1g] a time domain resource occupied by the first radio signal is used for determining a second time window,

[1h] a time domain resource occupied by the second radio signal is within the second time window, and the second time window is within the first time window;

[1i] a time domain resource occupied by the second radio signal is used for determining a third time window, and the end time of the third time window is the end time of the first time window; and

[1j] the second time window and the third time window have overlapped time domain resource(s).

Ex. 1001, 25:44–67; *see* Pet. vii.

E. Asserted Challenges of Unpatentability

Petitioner asserts the following challenges of unpatentability (Pet. 1):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–20	103	Xia ¹
1–20	103	Xia, Jover ²
1, 3, 4, 6, 8, 9	103	3GPP-LTE ³
11, 13, 14, 16, 18, 19	103	3GPP-LTE, Yi ⁴

¹ U.S. Pat. 10,779,350 B2 to Xia, published Sept. 15, 2020 (Ex. 1004).

² U.S. Pub. 2015/0141026 A1 to Jover, published May 21, 2015 (Ex. 1005).

³ Petitioner describes 3GPP-LTE as “the representation of a standard detailed by disclosures found in the collection of Technical Specifications” in Exhibits 1023–1029 and 1035, each of which Petitioner asserts became publicly available at various dates in 2017. Pet. 2–3.

⁴ U.S. Pub. 2017/0215207 A1 to Yi, published July 27, 2017 (Ex. 1031).

Petitioner relies on the declaration of Dr. Robert Akl (Ex. 1003).
Patent Owner has not submitted declaration testimony at this stage.

III. ANALYSIS

A. Level of Ordinary Skill in the Art

We review the challenges of unpatentability in view of the understanding of a person of ordinary skill in the art at the time of the invention. *Graham*, 383 U.S. at 13, 17. Petitioner asserts that

A person of ordinary skill in the art (POSITA) would have had at least [a bachelor's degree in] electrical engineering, computer engineering, computer science, or a similar field, along with two years of experience designing or developing wireless networks. Additional education might substitute for some of the experience, and additional substantial experience might substitute for some of the educational background. . . . A POSITA would also have familiarity with the 3GPP LTE standards, and would have understood how to search through the available Technical Specifications for implementing RAN technologies.

Pet. 21–22 (citing Ex. 1003 ¶¶ 50–53).

Patent Owner uses Petitioner's proposed level of skill in the art at this stage, with a proposed modification to insert “a bachelor's degree in” to Petitioner's statement. Prelim. Resp. 12–13; *id.* at 12, n.1. We have inserted this proposed modification in brackets in the above block quotation.

We are persuaded, on the present record, that Petitioner's proposal, as modified by Patent Owner, is consistent with the problems and solutions in the '113 patent and prior art of record. We adopt Petitioner's skill definition at this stage.

B. Claim Construction

The parties do not propose any claim constructions. *See* Pet. 11–12; Prelim. Resp. 8. As no terms are in dispute, we determine that no terms require construction at this stage.

C. Asserted Obviousness over Xia and over Xia and Jover

Petitioner contends that claims 1–20 would have been obvious over Xia, alone or in combination with Jover. Pet. 22–63. As Petitioner argues these challenges together, we likewise address them together at this stage.

1. Independent Claim 1

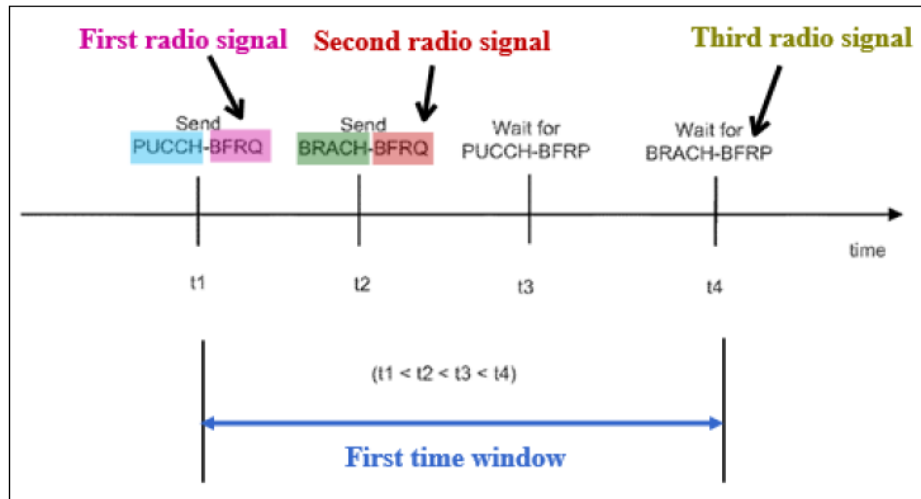
For claim 1, Patent Owner disputes Petitioner’s showing for limitations [1d], [1e], and [1i]. Prelim. Resp. 15–23. We first address the parties’ arguments for these limitations and then address the undisputed limitations.

- a. [1d] monitoring a third radio signal in a first time window;*
[1i] a time domain resource occupied by the second radio signal is used for determining a third time window, and the end time of the third time window is the end time of the first time window

Petitioner contends that Xia discloses limitations [1d] and [1i]. Pet. 29–31, 43–44.⁵ For limitation [1d], “monitoring a third radio signal in a first time window,” Petitioner argues that after sending first and second beam failure recovery requests (BFRQs), “Xia’s UE waits for (monitors) a [beam failure recovery response] (BFRP) (**‘third radio signal’**) in a first

⁵ Throughout the Petition, Petitioner cites a provisional application that Xia claims priority to. *E.g.*, Pet. 23 (citing Ex. 1012). We do not reproduce these citations, as Patent Owner does not challenge Xia’s priority claim.

time window, shown in FIG. 6B.”⁶ *Id.* at 29 (citing Ex. 1004, 14:7–12, 11:45–12:5; Ex. 1003 ¶¶ 111–14). Petitioner annotates Figure 6B as follows (illustrating first, second, and third radio signals and a first time window):



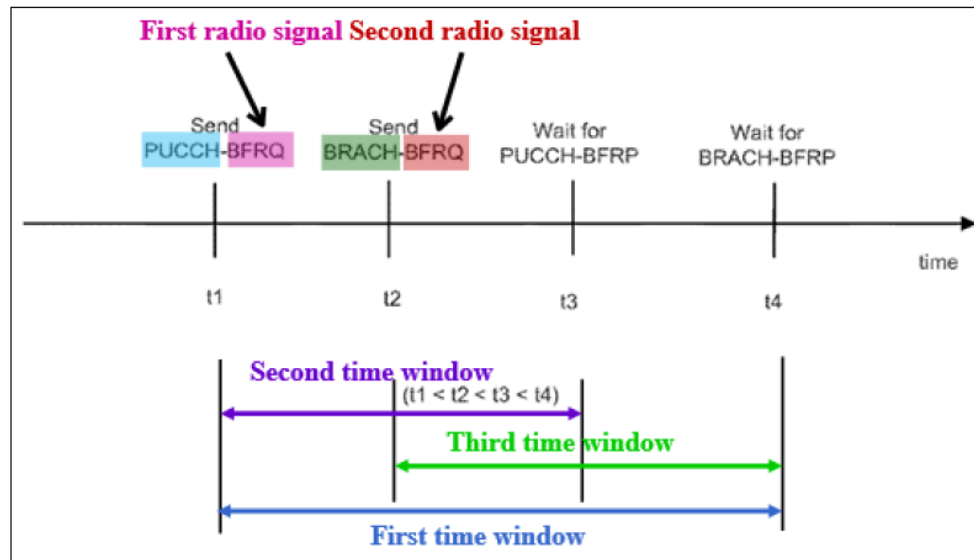
APPLE-1004, FIG. 6B (annotated); APPLE-1012, FIG. 6.

Id. at 30. As shown in annotated Figure 6B, Petitioner argues, “Xia’s UE waits for the BFRP (i.e., PRACH-BFRP⁷) from the base station from t1 to t4 (**‘first time window’**) because a single BFRP is sent in response to two BFRQs.” *Id.* (citing Ex. 1004, 14:7–12).

For limitation [1i], “a time domain resource occupied by the second radio signal is used for determining a third time window, and the end time of the third time window is the end time of the first time window,” Petitioner again relies on Figure 6B of Xia, with additional annotations reproduced below (illustrating first and second radio signals and first, second, and third time windows):

⁶ We omit Petitioner’s text coloring throughout this decision.

⁷ Figure 6B’s reference to “BRACH-BFRP” is a typo, as it should say “PRACH-BFRP.” See Ex. 1004 ¶91 (“[D]ifferent channels (e.g., PUCCH and PRACH) may be used to send the BFRQ (and receive the BFRP).”).



APPLE-1004, FIG. 6B (annotated); APPLE-1012, FIG. 6.

Pet. 43. As shown above, Petitioner’s annotations depict that in Xia Figure 6B, a time domain resource occupied by the second radio signal (beginning at t_2 in Figure 6B) is used for determining a third time window (the time window between t_2 and t_4), and that the end time of the third time window (t_4) is the end time of the first time window (t_4). *Id.* (citing Ex. 1003 ¶¶ 139–42).

After considering Patent Owner’s arguments, which we address below, we agree with Petitioner at this stage that Xia discloses limitations [1d] and [1i].

Patent Owner first argues that Xia does not disclose “monitoring a third radio signal in a first time window” in limitation [1d] “because Xia stops monitoring beyond t_3 if a PUCCH-BFRP is received at t_3 .” Prelim. Resp. 17. “In other words,” Patent Owner argues, “Xia’s ‘single BFRP’ is a response to only one of the first and second radio signals, which would give the first time window a variable length.” *Id.* That means, according to

Patent Owner, that if a PUCCH-BFRP is received at t3 in Xia, t3 would end the UE's monitoring period for that single BFRP, and thus end the first time window before t4. *Id.*

This argument fails to undermine Petitioner's showing at this stage because Patent Owner focuses on one possibility in Xia while ignoring its other teachings. "[T]he reference must be evaluated for all it teaches[.]" *In re Bode*, 550 F.2d 656, 661 (CCPA 1977). In Xia, if a PUCCH-BFRP is *not* received at t3, Xia continues monitoring for the PRACH-BFRP at t4. *See* Ex. 1004, 14:10–12 ("The UE 404 then wa[i]ts for a single BFRP—a PUCCH-BFRP at time t3 *or a PRACH-BFRP at t4*[.]" (emphasis added)). In that instance, Dr. Akl testifies that the time window would extend from t1 to t4. Ex. 1003 ¶ 112. This testimony is unrebutted at this stage.

Patent Owner next argues that Xia does not disclose "the end time of the third time window is the end time of the first time window" in limitation [1i]. Prelim. Resp. 17. This argument is similar to Patent Owner's position for limitation [1d]. That is, Patent Owner argues that "the end time of . . . the first time window would end at Xia's t3 if a PUCCH-BFRP were received," whereas "the end of the third time window, the end of the waiting period for PRACH-BFRP, would always be t4." *Id.* Patent Owner illustrates this alleged discrepancy as follows, annotating Figure 6B to show its view of Xia's first and third time windows:

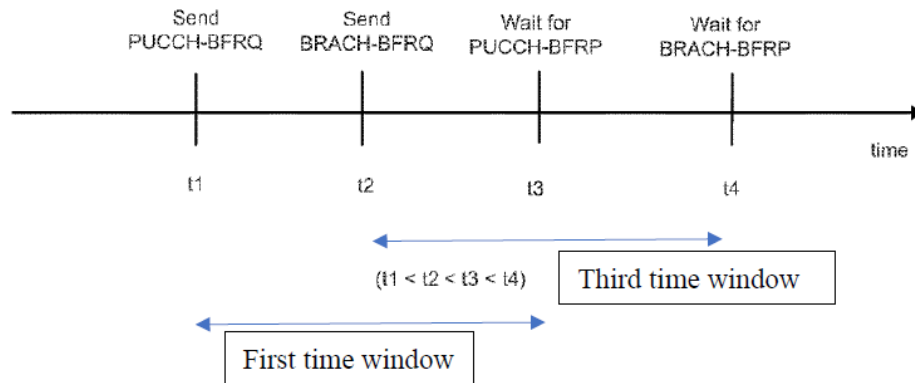


FIG. 6B

Id. at 18. In the above Figure, Patent Owner’s depiction of the first time window ends at t_3 , whereas the third time window ends at t_4 , which would not meet the claimed “the end time of the third time window is the end time of the first time window” in limitation [1i]. *See id.*

We find this argument unpersuasive at this stage for similar reasons as with Patent Owner’s limitation [1d] argument. Patent Owner again ignores Xia’s disclosure that if a PUCCH-BFRP is not received at t_3 , Xia continues monitoring for the PRACH-BFRP at t_4 . *See* Ex. 1004, 14:10–12. Dr. Akl testifies, and Patent Owner does not rebut at this stage, that “Xia’s UE waits for a single BFRP from the base station, a PUCCH-BFRP at t_3 or a PRACH-BFRP at t_4 ,” and thus, “as illustrated in FIG. 6B, both the ‘first time window’ and ‘third time window’ end when the BFRP is received.” Ex. 1003 ¶¶ 140–41. This un rebutted testimony is sufficient at this stage to support Petitioner’s argument for limitation [1i].

- b. *[1e] wherein a measurement for the target radio signal obtains a target measurement value, the target measurement value, when higher than a target threshold is used for triggering the transmission of the first radio signal and the second radio signal*

Petitioner argues that Xia alone or Xia in combination with Jover discloses this limitation. Pet. 31–38. Patent Owner disputes both positions. Prelim. Resp. 18–23.

(1) Xia alone

Petitioner first argues that Xia discloses this limitation, for example, by disclosing monitoring a reference signal “to assess whether a beam failure **trigger condition** has been met.” Pet. 31–32 (citing Ex. 1004, 10:27–34). According to Petitioner, “the detection of beam failure based on measured signal values triggers (*causes*)” the transmission of the first and second BFRQs. *Id.* at 32–33 (citing Ex. 1003 ¶¶ 115–130).

Patent Owner contends that the Petition fails to describe how the claimed “triggering the transmission of the first radio signal and the second radio signal” is met. Prelim. Resp. 19. Nothing in Xia “*causes the transmission* of the first and second radio signals,” Patent Owner contends. *Id.* Instead, Patent Owner asserts, “Xia merely states a sequence of events, namely that ‘[a]fter the UE 404 detects the beam failure; a beam failure recovery request (BFRQ) transmission is performed.’” *Id.* (citing Ex. 1004, 10:42–43). Thus, Patent Owner contends, Xia “does not render obvious the claimed system where the exceeding of a target threshold itself *causes the transmission* of the first and second radio signals, as the claim requires.” *Id.*

We agree with Petitioner at this stage. Petitioner provides sufficient evidence to show that Xia's beam failure detection triggers transmission.⁸ For example, Xia discloses that a UE "detect[s] a beam failure" by monitoring a reference signal "to assess whether a beam failure trigger condition has been met." Ex. 1004, 10:27–29. Xia further explains that "[a]fter the UE 404 detects the beam failure[,] a beam failure recovery request (BFRQ) transmission is performed." *Id.* at 10:42–43. Dr. Akl's unrebutted testimony based on these disclosures is that "the detection of beam failure based on measured signal values triggers (*causes*) the transmission of both the PUCCH-BFRQ and PRACH-BFRQ transmissions." Ex. 1003 ¶ 116. This unrebutted testimony, in our view, better squares with Xia's teachings than Patent Owner's assertion that "Xia's "beam failure trigger condition . . . only corresponds to a condition that triggers an assessment of beam failure, rather than triggering signal transmission for the first and second radio signals." *See* Prelim. Resp. 19–20.

(2) Xia and Jover

Petitioner also argues that the combination of Xia and Jover would have rendered obvious limitation 1[e]. Pet. 36–38. According to Petitioner, Jover "specifically discloses using a target measurement value (BER) higher than a target threshold (1%) as a triggering condition." *Id.* at 36 (citing Ex. 1003 ¶¶ 115–30). Petitioner further argues that a POSITA would have been motivated to adopt Jover's triggering condition in Xia's method "such that Xia's beam failure triggering condition uses BER as the target

⁸ We need not find at this stage that "triggering the transmission" requires "causing" the transmission, as Patent Owner argued in the Samsung IPR. *See* IPR2023-00601, Paper 16 at 8–10.

measurement value, as Jover teaches.” *Id.* (citing Ex. 1005 ¶¶ 39–40; Ex. 1003 ¶¶ 115–30). Among other reasons, Petitioner contends that a POSITA would have been motivated to combine “to improve the accuracy and reliability of the beam failure determination.” *Id.* at 37 (citing Ex. 1003 ¶¶ 115–30). Petitioner further contends that a POSITA would have had a reasonable expectation of success because “it would have been straightforward for a POSITA to implement Jover’s triggering condition in Xia’s method.” *Id.* at 38 (citing Ex. 1003 ¶¶ 115–30).

After considering Patent Owner’s arguments, which we address below, we agree with Petitioner at this stage that the combination of Xia and Jover renders obvious limitation [1e].

Patent Owner first argues that Jover “does not cure the deficiencies of Xia because Jover’s threshold condition for an increase in BER is not used for triggering a transmission of the first and second radio signal.” Prelim. Resp. 20. Just like Xia, Patent Owner contends, Jover discloses no “causality between the threshold being exceeded and transmitting the first and second radio signal.” *Id.* at 21. This argument does not undermine Petitioner’s showing at this stage because Petitioner relies on Xia, not Jover, for the claimed “triggering the transmission,” or “causality,” as Patent Owner calls it. *See* Pet. 36–38. That is, Petitioner relies on Jover for the triggering *condition* and on Xia for the actual triggering. *See id.* Patent Owner’s argument attacking the references individually is unpersuasive. *See In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) (“Non-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references.”).

Patent Owner next contends that one of ordinary skill in the art would not have combined Xia and Jover “since Jover is directed to the opposite objective of the ’113 Patent or Xia.” Prelim. Resp. 21. That is, Patent Owner asserts, Jover teaches away from the disclosed methods. *Id.* at 22. Patent Owner explains, “Jover provides no attempt to improve the beam strength, but rather ignores it through beam sweeping or nullif[ies] it, in contrast to the purpose of the ’113 Patent.” *Id.* at 22–23.

At this stage, Patent Owner’s argument is insufficient to undermine Petitioner’s showing, as Patent Owner does not sufficiently explain how Jover teaches away. For example, Patent Owner does not adequately explain how Jover “criticize[s], discredit[s], or otherwise discourage[s]” the modification proposed by Petitioner. *See In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004). At best, Patent Owner asserts that Jover teaches an alternative method (ignoring beam strength through beam sweeping or nullification). Prelim. Resp. 22–23. But “[a] reference does not teach away . . . if it merely expresses a general preference for an alternative invention[.]” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009).

Further, to the extent that Patent Owner implies a nonanalogous art argument by stating that “Jover is directed to the opposite objective of the ’113 Patent or Xia,” this argument is underdeveloped and therefore unpersuasive at this stage. *See* Prelim. Resp. 21.

Accordingly, on this record, Petitioner persuades us that the combination of Xia and Jover discloses limitation [1e] and that one of ordinary skill likely would have combined Xia and Jover in the manner

proposed, with reasonable expectation of success, to meet the claim limitation.

c. Undisputed Limitations

Petitioner asserts that Xia or the combination of Xia and Jover discloses the preamble and the remaining limitations of claim 1. Pet. 22–46. Petitioner identifies where the references teach these limitations, supported with testimony from Dr. Akl, which Patent Owner does not specifically rebut at this stage. *Id.*

We determine, on this record, that Xia, alone or in combination with Jover, discloses the preamble (whether or not limiting) and the remaining undisputed limitations of claim 1. *See LG Elecs., Inc. v. Conversant Wireless Licensing S.A.R.L.*, 759 F. App’x 917, 925 (Fed. Cir. 2019) (nonprecedential) (“The Board is ‘not required to address undisputed matters’ or arguments about limitations with which it was never presented.”) (quoting *In re NuVasive, Inc.*, 841 F.3d 966, 974 (Fed. Cir. 2016)).

d. Summary as to Claim 1

Based on the preliminary record before us, Petitioner has shown a reasonable likelihood that claim 1 would have been obvious over Xia and also would have been obvious over the combination of Xia and Jover.

2. Independent Claims 6, 11, 16

Petitioner sets forth similar arguments for independent claims 6, 11, and 16 as for claim 1. *See* Pet. 42–46, 49–57, 60–64. Patent Owner relies on the same arguments for these claims as it does for claim 1. Prelim. Resp. 29–30. For similar reasons as discussed above, Petitioner has shown a reasonable likelihood that claims 6, 11, and 16 would have been obvious

over Xia and would have been obvious over the combination of Xia and Jover.

3. Dependent Claims 2–5, 7–10, 12–15, 17–20

Petitioner contends that dependent claim 2–5, 7–10, 12–15, and 17–20 would have been obvious over Xia or the combination of Xia and Jover. Pet. 36–42, 46–48, 57–59, 65–67. Petitioner provides a detailed analysis explaining where Xia or the combination of Xia and Jover discloses or suggests the limitations in these dependent claims, which Patent Owner does not contest at this stage. Prelim. Resp. 30.

We leave for trial the issue of whether Petitioner establishes that Xia or the combination of Xia and Jover would have rendered obvious claims 2–5, 7–10, 12–15, and 17–20. *See* 37 C.F.R. § 42.108(a).

D. Asserted Obviousness over 3GPP-LTE and over 3GPP-LTE and Yi

Petitioner also contends that claims 1, 3, 4, 6, 8, and 9 would have been obvious over 3GPP-LTE, and that claims 11, 13, 14, 16, 18, and 19 would have been obvious over the combination of 3GPP-LTE and Yi. Pet. 63–94. Patent Owner raises competing arguments. Prelim. Resp. 23–30.

As Petitioner sufficiently shows at this stage that claims 1–20 would have been obvious over Xia alone or in combination with Jover, we leave Petitioner’s remaining challenges for trial. *See* 37 C.F.R. § 42.108(a).

IV. CONCLUSION

At this stage of the proceeding, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing on its challenges as to at least one challenged claim. At this preliminary stage, we have not made a

final determination as to the patentability of the challenged claims or any underlying factual and legal issues.

V. ORDER

It is, therefore,

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of all challenged claims of the '113 patent is instituted with respect to all challenges of unpatentability set forth 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 commencing on the entry date of this Decision.

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Patent 10,568,113 B2

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