UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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SAMSUNG ELECTRONICS CO., LTD., and
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioner,

v.

APEX BEAM TECHNOLOGIES LLC,
Patent Owner.

_____

IPR2023-00601
Patent 10,568,113 B2

_____

Before JOHN D. HAMANN, SEAN P. O'HANLON, and SCOTT RAEVSKY, *Administrative Patent Judges*.

RAEVSKY, *Administrative Patent Judge*.

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

APPLE 1163
Apple v. Apex Beam
IPR2025-00921

I. INTRODUCTION

Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively, "Petitioner") filed a Petition (Paper 1, "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 8, "Prelim. Resp.").

Under 35 U.S.C. § 314(a), an *inter partes* review may not be instituted unless it is determined that there is a reasonable likelihood that the petitioner would prevail with respect to at least one of the claims challenged in the petition. 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. Accordingly, we institute an *inter partes* review with respect to all challenged claims and grounds asserted in the Petition. 37 C.F.R. § 42.108(a) (2022).

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 parties identify the following infringement lawsuits involving the '113 patent: *Apex Beam Technologies LLC v. Samsung Electronics Co., Ltd. et al.*, No. 2:22-cv-00188-JRG (E.D. Tex.); *Apex Beam Technologies LLC v. ZTE Corporation*, No. 2:22-cv-00031-JRG-RSP (E.D. Tex.); *Apex Beam Technologies LLC v. OnePlus Technology (Shenzhen) Co., Ltd.*, No. 2:22-

cv-00032-JRG (E.D. Tex.); and *Apex Beam Technologies LLC v. TCT Mobile International Limited et al.*, No. 2:21-cv-00438-JRG (E.D. Tex.) (collectively, the "related District Court litigation"). Pet. 69–70; Paper 6, 3.

The following *inter partes* review has also been filed against the '113 patent: *Samsung Electronics Co. v. Apex Beam Technologies LLC*, IPR2023-00602 (PTAB filed Feb. 28, 2023).

B. Real Parties-in-Interest

Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. identify themselves as the only real parties-in-interest (RPI). Pet. 69. Patent Owner identifies itself as the sole RPI. Paper 6, 2.

C. The '113 patent

The '113 patent describes transmission schemes for radio signals, including a method and a device for a User Equipment (UE) to autonomously determine transmission of information. Ex. 1001, 1:17–21. The '113 patent explains that massive Multi-Input Multi-Output (MIMO) is a research hotspot of next-generation mobile communications. *Id.* at 1:25–27. In massive MIMO, multiple antennas experience beamforming to form a relatively narrow beam which points to a particular direction to improve the quality of communication. *Id.* at 1:27–30. It has been proposed that a UE should conduct a measurement on a service beam during the communication process and that, when the quality of the service beam is found degraded, a Physical Uplink Control Channel (PUCCH) and a Physical Random Access Channel (PRACH)-like contention-free channel should be used by the UE to transmit a beam recovery request to a base station, which then changes the service beam. *Id.* at 1:32–39.

The ’113 patent explains that if a UE, after using one channel to transmit a beam recovery request, cannot transmit the beam recovery request again during a time window of waiting for a response, then a time-frequency resource configured within the time window cannot be used by the UE to transmit a beam recovery request, which consequently results in a low utilization of the time-frequency resources used for transmitting the beam recovery request. *Id.* at 1:43–52.

An embodiment of a solution involves steps shown in the following flowchart of Figure 1:

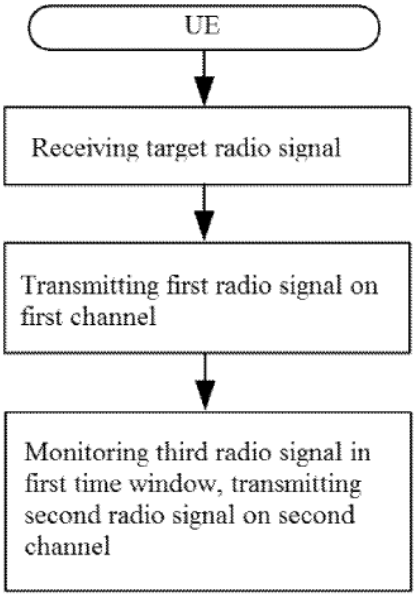


FIG. 1

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, wherein a measurement for the target radio signal is used for triggering the transmission of the first radio signal and the second radio signal; 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 13:46–56.

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

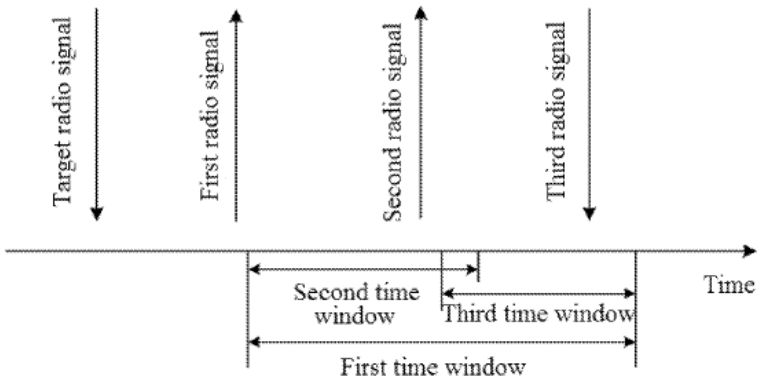


FIG.6

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. 14–35.

E. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability (Pet. 13):

Claim(s) Challenged	35 U.S.C. §[1]	Reference(s)/Basis
1–20	103	Xia[2]
1–20	103	Xia, Jover[3]

Petitioner relies on the declaration of Dr. Harry V. Bims (Ex. 1002). Patent Owner has not submitted declaration testimony at this stage.

III. ANALYSIS

A. Discretion under 35 U.S.C. § 314(a)

Patent Owner argues that we should exercise discretion under § 314(a) to deny institution in light of the related District Court litigation. Prelim. Resp. 27–34.

We consider the following factors when determining whether to deny institution under § 314(a) based on a parallel district court proceeding:

> 1. whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted;
>
> 2. proximity of the court's trial date to the Board's projected statutory deadline for a final written decision;

[1] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 285–88 (2011), revised 35 U.S.C. §§ 102, 103 effective March 16, 2013. The '113 patent was filed after March 16, 2013 and does not claim priority to any application filed before March 16, 2013, so the AIA versions of §§ 102, 103 apply. Ex. 1001, codes (22), (30).
[2] U.S. Publication No. 2019/0053294 A1 to Xia, published Feb. 14, 2019 (Ex. 1004).
[3] U.S. Publication No. 2015/0141026 A1 to Jover, published May 21, 2015 (Ex. 1005).

> 3. investment in the parallel proceeding by the court and the parties;
>
> 4. overlap between issues raised in the petition and in the parallel proceeding;
>
> 5. whether the petitioner and the defendant in the parallel proceeding are the same party; and
>
> 6. other circumstances that impact the Board's exercise of discretion, including the merits.

Apple Inc. v. Fintiv, Inc., IPR2020-00019, Paper 11 at 5–6 (PTAB Mar. 20, 2020) (precedential) ("*Fintiv*"). We also consider "several clarifications" made by the Director of the United States Patent and Trademark Office ("USPTO"). *See* USPTO Memorandum, Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation, 2 (June 21, 2022) ("Director's Memo").[4]

The Director's Memo provides that "[c]onsistent with *Sotera Wireless, Inc.*,[5] the PTAB will not discretionarily deny institution in view of parallel district court litigation where a petitioner presents a stipulation not to pursue in a parallel proceeding the same grounds or any grounds that could have reasonably been raised before the PTAB." Director's Memo 3. With our authorization, Petitioner has filed a stipulation, which stipulates that "if the PTAB institutes *inter partes* review, Petitioner 'will not pursue in [*Apex Beam Technologies LLC v. Samsung Electronics Co., Ltd. et al.*, Case No. 2:22-cv-00188-JRG (E.D. Tex.) (consolidated with *Apex Beam*

[4] Available at https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf.
[5] *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 at 18–19 (PTAB Dec. 1, 2020) (precedential).

Technologies LLC v. ZTE Corporation, Case No. 2:22-cv-00031-JRG-RSP (E.D. Tex.))] the specific grounds [asserted in IPR2023-00601], or . . . any other ground . . . that was raised or could have been reasonably raised in an IPR (i.e., any ground that could be raised under §§ 102 or 103 on the basis of prior art patent or printed publications).'" Ex. 1023, 1.

We determine that the language of this stipulation sufficiently comports with the language of the stipulation discussed in the Director's Memo, consistent with *Sotera Wireless, Inc.* *See* Director's Memo 3. We accordingly decline to discretionarily deny institution in view of the related District Court litigation.

B. Notice Ranking Petitions

Petitioner filed two concurrent petitions (IPR2023-00601 and IPR2023-00602) challenging the validity of claims 1–20 of the '113 patent. Consistent with the Board's practice for handling parallel petitions provided in the Consolidated Trial Practice Guide ("CTPG"),[6] Petitioner filed a Notice Ranking Petitions (Paper 2, "Notice"). *See* CTPG 59–60. Patent Owner did not file a response to Petitioner's Notice or address the Notice in its Preliminary Response.

In the Notice, Petitioner states that although it "believes that both Petitions are meritorious and justified," it ranks the Petition filed in this proceeding first and the -00602 petition second. Notice, 1. Although we have discretion to deny a parallel petition under 35 U.S.C. § 314(a) (*see* CTPG 61), we decline to exercise that discretion here, in light of Petitioner ranking this Petition first.

[6] Available at https://www.uspto.gov/TrialPracticeGuideConsolidated.

C. Principles of Law

A claim is unpatentable as obvious if "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007) (quoting 35 U.S.C. § 103(a)). We resolve the question of obviousness based on underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the prior art and the claims; (3) the level of skill in the art; and (4) when in evidence, objective indicia of nonobviousness. *See Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17–18 (1966).

We apply these principles to the Petition's challenges.

D. Level of Ordinary Skill in the Art

We review the grounds 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 master's degree in electrical engineering or a similar field and at least two years of experience working with telecommunications systems, including multiple-input multiple-output (MIMO) technology. Additional relevant work experience can compensate for less education, and *vice versa*.

Pet. 14 (citing Ex. 1002 § IX).

Patent Owner uses Petitioner's proposed level of skill in the art at this stage. Prelim. Resp. 8. We are persuaded, on the present record, that Petitioner's proposal is consistent with the problems and solutions in the '113 patent and prior art of record. We adopt Petitioner's definition of the

level of skill for the purposes of this Decision, except that we do not include in our definition Petitioner's last sentence regarding additional relevant work experience compensating for less education and *vice versa*, as this sentence is vague.

E. Claim Construction

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

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. *See 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)).

F. Asserted Obviousness over Xia (Ground 1) and over Xia and Jover (Ground 2)

Petitioner contends that claims 1–20 would have been obvious over Xia and that claims 1–20 also would have been obvious over the combination of Xia and Jover. Pet. 14–67. As Petitioner argues these grounds together, we likewise address them together at this stage.

1. *Overview of Xia*

Xia is entitled "Beam Failure Recovery Request" and claims priority to a provisional application filed August 10, 2017 (the "Xia Provisional," Ex. 1012), which was filed one day prior to the earliest priority date of the '113 patent. Ex. 1004, codes (54), (60); Ex. 1001, code (30) (Aug. 11, 2017 foreign priority date).[7]

Xia describes technology for beam failure recovery in user equipment. *Id.*, code (57). The technology is capable of detecting a beam failure event between the user equipment and a base station, sending a first beam failure recovery request (BFRQ) to the base station upon detection of the beam failure and searching for a beam failure recovery response (BFRP) within a first response window. *Id.*

Figure 6B of Xia, below, depicts a timing diagram for sending multiple beam failure requests and responses. *Id.* ¶ 29.

[7] Petitioner bears the burden of production to show that Xia is entitled to the filing date of the Xia Provisional. *See Dynamic Drinkware*, 800 F.3d at 1378–79. It satisfied that initial burden by arguing that Xia renders obvious the challenged claims. *See id.* at 1379; *see generally* Pet. The burden of production then shifts to Patent Owner to argue, for example, that Xia is not prior art because Xia is not entitled to the benefit of the filing date of the Xia Provisional. *See Dynamic Drinkware*, 800 F.3d at 1380. If Patent Owner chooses to meet this burden of production, Petitioner will then bear the burden of persuasion to show that Xia is entitled to priority to its provisional application filing date. *Id.* at 1379. Although Petitioner preemptively argues that Xia is entitled to priority, Patent Owner does not argue at this stage that Xia is not prior art. *See, e.g.*, Pet. 12–13 (claim chart comparing Xia and Xia Provisional); *see also id.* at 14–67 (citations to both Xia and Xia Provisional). Accordingly, we leave for trial the issue of whether Xia is, in fact, prior art to the '113 patent.

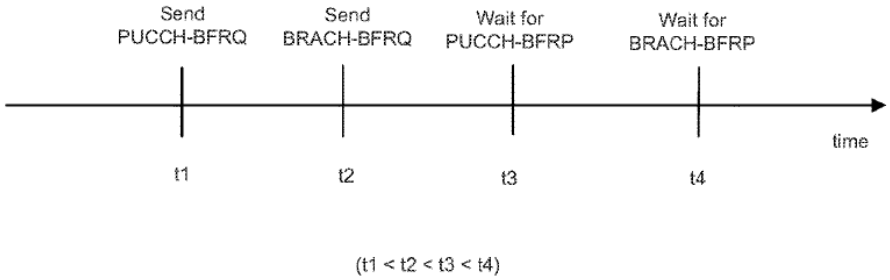


FIG. 6B

In Figure 6B, a single BFRP is sent in response to two BFRQs. *Id.* ¶ 102. In the example shown, the UE sends two BFRQs—a PUCCH-BFRQ at time t1 and a PRACH-BFRQ at time t2. *Id.* The UE then waits for a single BFRP—a PUCCH-BFRP at time t3 or a PRACH-BFRP at t4, from a base station. *Id.* ¶¶ 102, 38 (defining base station). In response, the base station sends out a single BFRP at time t3 or t4. *Id.*

2. *Overview of Jover*

Jover is entitled "Endpoint Device Antenna Beam Forming Based Jamming Detection and Mitigation" and was filed November 15, 2013. Ex. 1005, codes (54), (22). Jover describes a method and system of locating a source of a communication impairment. *Id.*, code (57). For example, the method detects the communication impairment and performs a sweep to locate a direction of the source of the communication impairment. *Id.* The sweep is performed in response to detecting the communication impairment at the endpoint device and generates a null in the direction of the source of the communication impairment. *Id.*

3. *Independent Claim 1*

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

Petitioner asserts that, to the extent the preamble is limiting, Xia teaches the preamble by disclosing "a wireless communication system 100 including '**user equipment 110A-110C**.'"[8] Pet. 14–15 (citing Ex. 1004 ¶ 37; Ex. 1002 ¶¶ 79–80).[9] Patent Owner does not dispute Petitioner's argument regarding the preamble at this stage. We need not determine whether the preamble is limiting because, on this record, we determine that Xia discloses it.

b. [1a] receiving a target radio signal

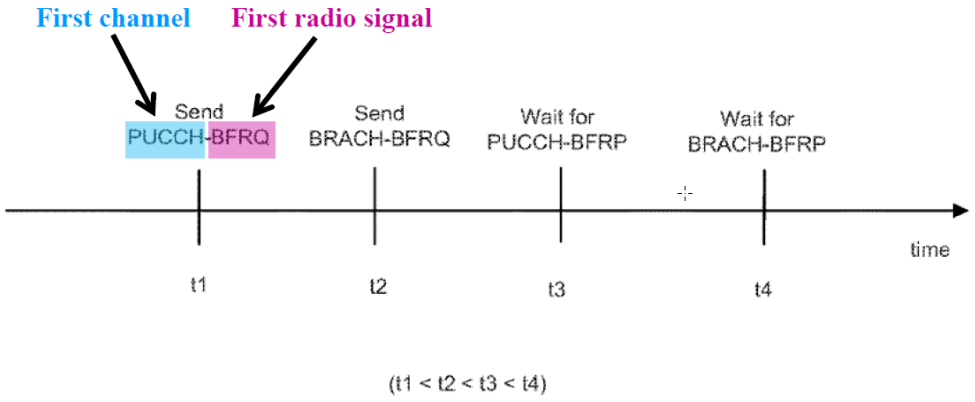
Petitioner contends that Xia discloses this limitation by describing "that the UE receives a target radio signal, which it calls a 'reference signal (beam failure detection RS),' from the base station." Pet. 17 (citing Ex. 1004 ¶¶ 76–78; Ex. 1002 ¶ 81). Patent Owner does not dispute Petitioner's arguments for this limitation. On this record, we agree with Petitioner that Xia discloses limitation [1a].

c. [1b] transmitting a first radio signal on a first channel

Petitioner contends that Xia discloses this limitation by describing that "after the UE detects the beam failure, a beam failure recovery request (BFRQ) transmission is performed." Pet. 18 (citing Ex. 1004 ¶ 78). Petitioner highlights the first radio signal on a first channel using Figure 6B

[8] We omit Petitioner's text coloring and italicization of reference names throughout this decision.
[9] For convenience, we omit Petitioner's citations to the Xia Provisional throughout, as whether Xia is prior art is not in dispute at this stage.

of Xia, reproduced below (as annotated by Petitioner to show a first channel and first radio signal):



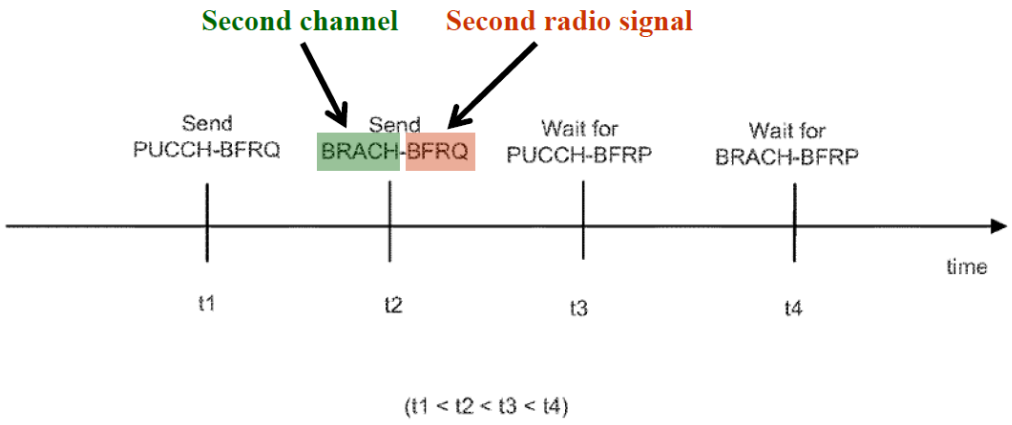
Xia, FIG. 6B (annotated); *Xia Provisional*, FIG. 6.

Id. at 19. Petitioner explains that in Figure 6B above, "the UE transmits a first Beam Failure Recovery Request (BFRQ) ('**first radio signal**') to the base station on a Physical Uplink Control Channel (PUCCH) ('**first channel**') (PUCCH-BFRQ)." *Id.* (citing Ex. 1004 ¶¶ 93, 97).

Patent Owner does not dispute this limitation at this stage. On this record, we agree with Petitioner that Xia discloses limitation [1b].

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

For this limitation, Petitioner argues that "Xia discloses that the UE transmits a second Beam Failure Recovery Request (BFRQ) ('**second radio signal**') to the base station on a Physical Random Access Channel (PRACH) ('**second channel**') (PRACH-BFRQ)." Pet. 20 (citing Ex. 1002 ¶ 87). Petitioner again reproduces an annotated version of Xia's Figure 6B to illustrate the second radio signal (annotated to depict a second channel and second radio signal):



Xia, FIG. 6B[5] (annotated); *Xia Provisional*, FIG. 6.

Id. Petitioner explains that in Figure 6B, "after a PUCCH-BFRQ is sent at t1, and before a PUCCH-BFRP arrives at the UE from the base station, the UE has a PRACH-BFRQ OPPORTUNITY and sends a second BFRQ using a PRACH-BFRQ." *Id.* at 21 (citing Ex. 1004 ¶¶ 93, 102; Ex. 1002 ¶¶ 88–89). Petitioner also notes that "BRACH-BFRQ" in Figure 6B corresponds to the term "PRACH-BFRQ" used throughout Xia when referring to the second beam recovery request. *Id.* at 20 n.5 (citing Ex. 1002 ¶ 37 n.2).

Patent Owner contends that Petitioner fails to show that Xia teaches this limitation "because Petitioner relies on the same signal sent twice to meet the first signal and second signal limitations." Prelim. Resp. 11. According to Patent Owner, Xia's two radio signals "contain the same information about the beam recovery request event." *Id.* That is, "Petitioner's alleged 'second signal' is the same BFRQ but transmitted over [a different channel]." *Id.* In Patent Owner's view, "sending beam failure recovery requests using PUCCH versus PRACH does not mean that the signals are different." *Id.* at 11–13 (citing Ex. 1004 ¶¶ 93–96).

Patent Owner further contends that the plain claim language and specification require the first and second radio signals to contain different information. *Id.* at 13. This is true, Patent Owner argues, "since if the first radio signal and second radio signal were conveying the same information, such as the same 'time resource' . . ., it would not be necessary for both signals to determine the multi-antenna related transmitting of the third radio signal, as described in the '113 Patent claims and specification." *Id.* at 13–14 (citing Ex. 1001, 9:1–3, 7:42–45, 24:58–60, 8:1–6).

On this record, we find Petitioner's arguments persuasive, as Xia Figure 6B (reproduced above) shows the transmission of two separate radio signals on two different channels, meeting the plain claim language of "transmitting a first radio signal on a first channel" and "transmitting a second radio signal on a second channel." *See* Pet. 19; Ex. 1004 ¶¶ 93, 97. In contrast, Patent Owner's argument is unsupported by the claim language and specification, on this record. The plain language of claim 1 does not specify the content of the two recited signals and thus does not appear to limit the first and second radio signals to different content. Although Claim 1 refers to "a time resource occupied by the first radio signal" and "a time domain resource occupied by the second radio signal," these time resources appear to refer to when these signals are transmitted rather than what content these signals contain. Thus, the plain language of claim 1 does not support Patent Owner's argument.

As for Patent Owner's citations to the specification, each one is couched in non-limiting language, which leads us to find at this stage that the specification contains no definition, disclaimer, or disavowal that would require limiting the first and second radio signals to require different

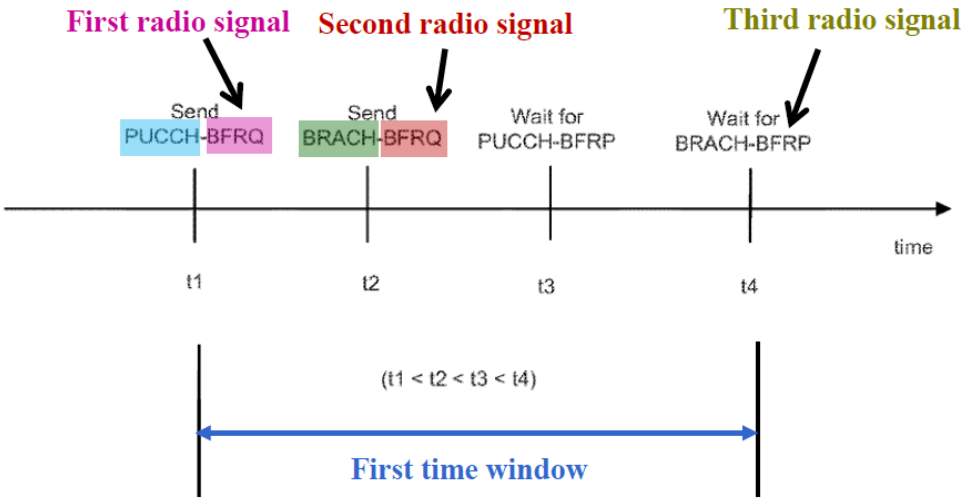
content. *See* Prelim. Resp. 13–14 (citing Ex. 1001, 9:1–3 ("*In one embodiment* . . . ."), 7:42–45 ("According to *one aspect* of the present disclosure . . . ."), 24:58–60 ("*In one subembodiment* . . . ."), 8:1–6 ("*In one subembodiment* . . . .") (all emphases added)). Even apart from this nonlimiting language, none of the citations supplied by Patent Owner appears to support Patent Owner's argument that the first and second radio signals are required to have different content. For example, the first passage Patent Owner cites states that "the transmitting" used for two separate channels is different, not that the content of two signals differs. *See id.* (citing Ex. 1001, 9:1–3 ("In one embodiment, the multi-antenna related *transmitting* used for the first channel and the multi-antenna related transmitting used for the second channel are different." (emphasis added))). None of Patent Owner's other cited passages fare better.

We conclude that Petitioner may meet its institution burden by showing that the prior art discloses transmitting two separate radio signals and need not show that the content of those two signals differs. On this record, Petitioner has shown that Xia discloses transmitting two separate radio signals on two separate channels in Figure 6B (above)—the PUCCH-BFRQ transmitted at time t1 and the [P]RACH-BFRQ transmitted at time t2. Pet. 18–21. Thus, at this stage we agree with Petitioner that Xia discloses limitation [1c].

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

Petitioner contends that Xia discloses this limitation. Pet. 21–23. Petitioner argues that after sending the first and second signals (BFRQs), "Xia's UE waits for (i.e., monitors) a beam failure recovery response

(BFRP) ('**third radio signal**') in a first time window." *Id.* at 21 (citing Ex. 1004 ¶¶ 102, 84; Ex. 1002 ¶ 90). Petitioner annotates Figure 6B to illustrate this teaching as follows (depicting first, second, and third radio signals and a first time window):



Xia, FIG. 6B (annotated); *Xia Provisional*, FIG. 6.

Id. at 22. As shown in Figure 6B, Petitioner argues, "Xia's UE waits for the BFRP (i.e., PRACH-BFRP) from the base station for a time window from t1 to t4 ('**first time window**')." *Id.* at 22–23 (citing Ex. 1002 ¶¶ 93–95).

Patent Owner first argues that Petitioner does not meet its burden on this limitation for similar reasons as with limitation 1[c], contending that because Xia does not disclose a "second radio signal," Xia also cannot disclose limitation 1[d]'s "third radio signal." Prelim. Resp. 14. We address Patent Owner's "second radio signal" argument above and find Patent Owner's "third radio signal" argument unavailing for similar reasons.

Patent Owner next disputes that Xia discloses the claimed "first time window." *Id.* at 15–17. That is because there are only two time windows in Xia, Patent Owner asserts. *Id.* at 15. These are: "(1) one time window starts from the PUCCH-BFRQ awaiting a PUCCH-BFRP (from t1 to t3); and (2) a

second time window starts from the BRACH-BFRQ awaiting a BRACH-BFRP (from t2 to t4)." *Id.* at 15–16 (citing Ex. 1004 ¶ 102). In Patent Owner's view, Petitioner's first time window "is merely a fabrication because it attempts to correlate the response time on a PRACH channel with the request time on a PUCCH channel as a time window, even though a PUCCH-BFRP might be received before the PRACH-BFRP and end both time windows." *Id.* at 16. "In that scenario," Patent Owner argues, "Petitioner's identified 'third radio signal' (*i.e.*, the BRACH-BFRP) falls outside of the 'first time window' that is from t1 to t3." *Id.*

At this stage, we find Petitioner's argument persuasive. We begin by reviewing the language of claim 1 to determine the metes and bounds of the "first time window." Claim 1 refers to the start time of the first time window as follows: "a time resource occupied by the first radio signal is used for determining the start time of the first time window." Claim 1 refers to the end time of the first time window as follows: "the end time of the third time window is the end time of the first time window." The claim also recites a "second time window . . . within the first time window." Although Patent Owner does not argue for any limiting definition from the specification for "first time window," we find the following embodiment in Figure 6 helpful to visualize an example of the "first time window":

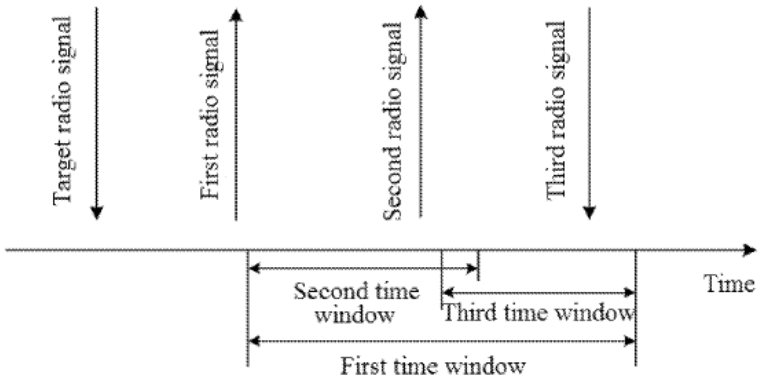
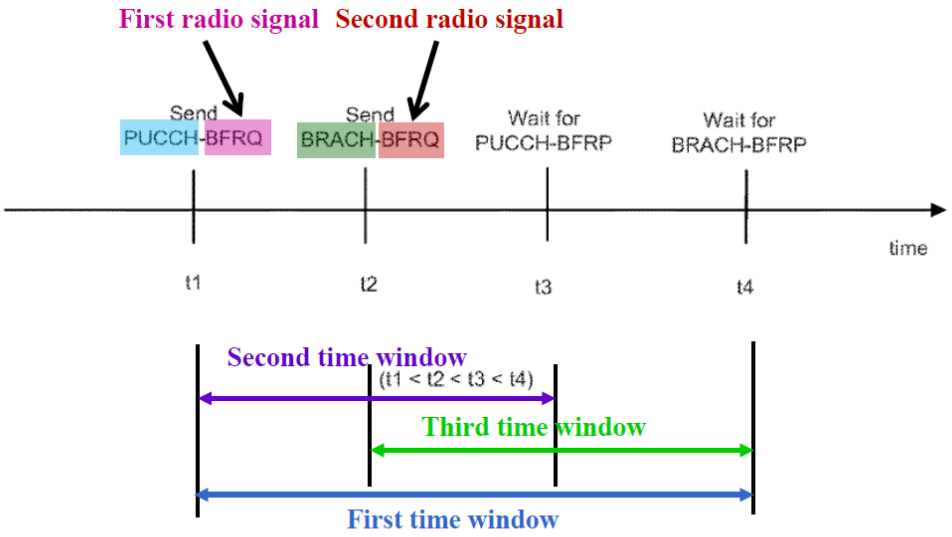


FIG.6

See Ex. 1001, 22:44–61. Figure 6 above depicts a time domain resource occupied by a first radio signal, which is used for determining the start time of a second time window, and a time domain resource occupied by a second radio signal, which is used for determining the start time of a third time window. *Id.* As shown, the first time window in Figure 6 has a start time corresponding to the second time window and an end time corresponding to the third time window.

Petitioner sufficiently persuades us for institution purposes that in Xia Figure 6B, the time from t1 to t4 constitutes a first time window as claimed. With respect to limitation [i], which we discuss in more detail below, Petitioner reproduces the following annotated version of Xia Figure 6B (depicting first and second radio signals and first, second, and third time windows):



Xia, FIG. 6B (annotated); *Xia Provisional*, FIG. 6.

Pet. 34. We reproduce this annotated Figure 6B here because it shows how Petitioner maps the claimed first, second, and third time windows in claim 1 to Xia. *See id.* At this stage, we determine that Xia Figure 6B teaches the time windows of claim 1, including the "first time window." As Dr. Bims explains, "Xia waits for the single BFRP from the starting position in time (t1) and the ending position in time (t4)," and so "Xia's UE thus monitors the single BFRP in a time window between t1 and t4, i.e., a 'first time window,' as claimed." Ex. 1002 ¶ 93 (citing Ex. 1004 ¶ 102). We find this testimony sufficiently persuasive at this stage.

Patent Owner's arguments to the contrary are unavailing because as Patent Owner acknowledges, Xia explicitly discloses two time windows—one from t1 to t3 and another from t2 to t4. *See* Ex. 1004 ¶ 102; Prelim. Resp. 15–16. Yet Patent Owner overlooks that, on this record, one of ordinary skill in the art would have viewed Xia's two windows as collectively defining another, larger time window (a "first time window") from t1 to t4. *See* Ex. 1002 ¶ 93. In other words, Xia sends a first radio

signal at t1 but may have to wait until t4 for the third radio signal to arrive, thus defining a first time window from t1 to t4. The scenario that Patent Owner postulates, i.e., where Xia's third radio signal comes earlier at t3 instead of t4, overlooks that Xia's third radio signal may not come until t4. *See* Prelim. Resp. 16. Thus, Patent Owner's arguments do not take into account the full teachings of Xia and are unavailing at this stage.

Accordingly, at this stage we agree with Petitioner that Xia discloses limitation [1d].

> *f. [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 (Ground 1) or Xia in combination with Jover (Ground 2) discloses this limitation. Pet. 23–29. We address each alternative in turn.

(1) Xia alone

Petitioner first argues that Xia discloses this limitation by disclosing monitoring a reference signal "to assess whether a beam failure **trigger condition** has been met." Pet. 23 (citing Ex. 1004 ¶ 76). According to Petitioner, this trigger condition causes the transmission of the first and second BFRQs ("the first radio signal and the second radio signal"). *Id.* (citing Ex. 1002 ¶ 97).

Petitioner further argues that it would have been obvious to compare various well-known indicators of beam failure, such as (for example) signal-to-noise ratio (SNR), bit error rate (BER), or block error rate (BLER), to a target threshold to determine whether beam failure has occurred. *Id.* at

23–24 (citing Ex. 1002 ¶ 98). As beam failure may be indicated by a *lower* SNR or, conversely, by a *higher* BER or BLER, Petitioner contends, a POSITA "would have found it obvious to have used BER or BLER as the target measurement value such that the triggering condition would be met when the target measurement value is ***higher*** than a target threshold." *Id.* at 24 (citing Ex. 1002 ¶ 98). Petitioner further contends, "implementing a target measurement value . . . that is [lower or] higher than a target threshold as a triggering condition . . . would have been a matter of simple design choice between the two known alternatives (lower and higher), which was well within the skill of a POSITA." *Id.* at 25 (citing Ex. 1002 ¶ 100).

Finally, Petitioner contends that "modifying Xia's trigger condition would have yielded predictable results—namely, accurately and reliably determining beam failures." *Id.* at 26 (citing Ex. 1002 ¶ 102). Petitioner further contends that a POSITA would have had a reasonable expectation of success because "it would have been straightforward for a POSITA to modify Xia's triggering condition to use a target measurement value (such as BER), such that the beam failure recovery would be triggered if the value was ***higher*** than a target threshold." *Id.* (citing Ex. 1002 ¶ 102).

Patent Owner first contends that Petitioner does not meet its burden on this limitation for similar reasons as with limitation 1[c], contending that because Xia does not disclose a "second radio signal," Xia also cannot disclose limitation 1[e]'s "triggering the transmission of the first radio signal and the second radio signal." Prelim. Resp. 17–18. We address Patent Owner's "second radio signal" argument above and find Patent Owner's related argument here unavailing for similar reasons.

Patent Owner further contends that Xia does not disclose "block error rate," and instead only discloses "the assessment where 'beam signal strength has dropped below a threshold.'" *Id.* at 18 (citing Ex. 1004 ¶ 76). Even if Xia disclosed BER, Patent Owner contends, Xia does not disclose the claimed "triggering the transmission of the first radio signal and the second radio signal." *Id.* At most, Patent Owner contends, a BER threshold in Xia would trigger one radio signal. *Id.* (citing Ex. 1004 ¶ 78 ("After the UE 404 detects the beam failure; a beam failure recovery request (BFRQ) transmission is performed.")).

On this record, we find persuasive Petitioner's argument over Xia alone. 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 (e.g., beam signal strength has dropped below a threshold)." Ex. 1004 ¶ 76. Thus, on this record, Xia discloses the claimed "measurement for the target radio signal obtains a measurement value" (e.g., Xia's "beam signal strength") and "wherein . . . a target threshold is used for triggering" (e.g., Xia's "beam failure trigger condition," "threshold"). *See id.*; Ex. 1002 ¶ 97. However, unlike claim 1's comparison "higher than a target threshold," Xia determines whether its measurement "has dropped below a threshold." Ex. 1004 ¶ 76. Petitioner contends, and we agree on this record, that it would have been obvious to modify Xia to monitor an indicator such as BER or BLER that would instead trigger a failure condition when the indicator is higher, rather than lower, than a target threshold. Pet. 24–26. Patent Owner's argument that Xia does not disclose block error rate is inapposite, as Petitioner argues for a modification of Xia to monitor an indicator such as

block error rate, and Patent Owner does not dispute the obviousness of this modification at this stage. *See id.*; Prelim. Resp. 18.

We also find unavailing Patent Owner's second argument, that Xia triggers at most one, not two, radio signals. Prelim. Resp. 18. Patent Owner points to Xia's teaching that "[a]fter the UE 404 detects the beam failure; a beam failure recovery request (BFRQ) transmission is performed." *Id.* (citing Ex. 1004 ¶ 78). Patent Owner views this passage as disclosing transmitting just one radio signal, but Patent Owner overlooks Xia's other disclosure of transmitting multiple BFRQ signals in response to a beam failure. For example, as explained in detail above, Figure 6B of Xia discloses transmitting two BFRQ signals in response to a beam failure:

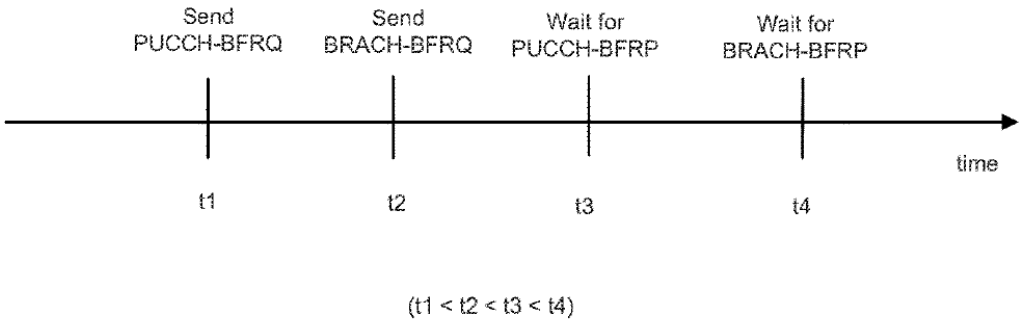


FIG. 6B

Ex. 1004, Fig. 6B. As can be seen in Figure 6B above, Xia transmits a first BFRQ signal on the PUCCH channel and a second BFRQ on the BRACH channel. *See id.* ¶¶ 91 ("more than one BFRQ (e.g., PUCCH-BFRQ, PRACH-BFRQ) is transmitted by a UE 404 for a single beam failure (BFR) event"), 102 ("the UE 404 sends two BFRQs—a PUCCH-BFRQ at time t1 and PRACH-BFRQ at time t2").

We therefore agree with Dr. Bims at this stage that "Xia uses an indicator of beam failure ('target measurement value') for triggering the transmission of the first and second BFRQs ('the first radio signal and the second radio signal')." Ex. 1002 ¶ 97, *cited in* Pet. 23. Accordingly, at this stage we agree with Petitioner that Xia alone suggests limitation [1e].

(2) Xia and Jover

Petitioner also argues that the combination of Xia and Jover would have rendered obvious limitation 1[e]. Pet. 26–29. According to Petitioner, Jover discloses detecting a "communication impairment" by detecting "a **threshold** drop in the SNR . . ., [and] an **increase in the BER** [bit-error rate] (e.g., when the **BER increases beyond one percent**)." *Id.* at 26 (citing Ex. 1005 ¶ 40); *see* Ex. 1005 ¶ 32 (defining BER). Petitioner asserts that Jover further discloses that when "one or more of such threshold conditions are met, the wireless channel sensing engine 320 may signal to the beam-forming engine 310 to begin the beam sweeping procedure." *Id.* at 27 (citing Ex. 1004 ¶ 40). Petitioner contends that Jover therefore "specifically discloses using a target measurement value (BER) that is higher than a target threshold (1%) as a triggering condition, as claimed." *Id.* (citing Ex. 1002 ¶ 104).

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 measurement value, as taught by Jover." *Id.* (citing Ex. 1005 ¶¶ 39–40; Ex. 1002 ¶ 105). A skilled artisan would have made the combination, Petitioner argues, because "Xia already discloses that the transmission of the first and second BFRQs to the base station in response to the detection of a communication failure," and

"Jover simply provides further details about a specific way to implement Xia's teachings regarding the detection of the communication failure." *Id.* at 27–28 (citing Ex. 1002 ¶ 106). Petitioner contends that a POSITA would have been motivated to combine "to improve the accuracy and reliability of the beam failure determination," among other reasons. *Id.* at 28 (citing Ex. 1002 ¶ 106). 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 29 (citing Ex. 1002 ¶ 107).

Patent Owner argues that Jover "does not cure the deficiencies of Xia." Prelim. Resp. 18. Instead, Patent Owner argues, Jover uses an increase in BER in a different context than claimed. *Id.* at 19. Jover's threshold condition for an increase in BER is only used to "begin the beam-sweeping procedure" and not on triggering transmission of two radio signals, Patent Owner contends. *Id.* (citing Ex. 1005 ¶ 40). Patent Owner further argues that "Petitioner completely avoids addressing whether Xia, Jover, or any of the other references cited would use BER as a threshold for 'triggering the transmission of the first radio signal and the second radio signal.'" *Id.*

At this stage, we agree with Petitioner and Dr. Bims 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. We agree, on this record, that "Xia already discloses that the transmission of the first and second BFRQs to the base station in response to the detection of a communication failure" and that "Jover simply provides further details about a specific way to implement Xia's teachings regarding

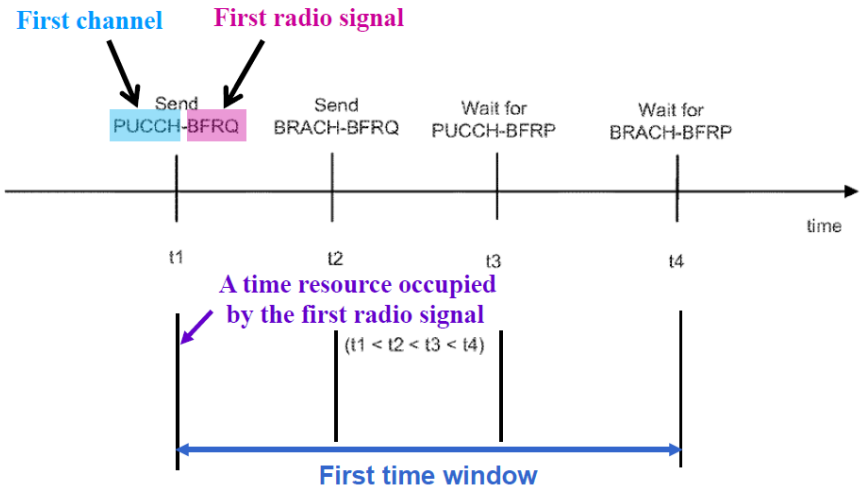
the detection of the communication failure." Pet. 27–28 (citing Ex. 1002 ¶ 106). We further agree, at this stage, that a POSITA would have been motivated to use Jover's measure of communication failure (BER) to improve the accuracy and reliability of Xia's beam failure determination. *Id.* at 28 (citing Ex. 1002 ¶ 106).

We find Patent Owner's position unavailing at this stage because it misstates Petitioner's position. Contrary to Patent Owner's assertion that Petitioner does not address whether the references would use BER as a threshold for triggering transmission, Petitioner does in fact rely on the combined references in this way. *See* Prelim. Resp. 19. Petitioner states, "[i]t would have been obvious to implement Jover's teachings in Xia's method such that Xia's beam failure *triggering condition uses BER* as the target measurement value, as taught by Jover." Pet. 27 (citing Ex. 1005 ¶¶ 39–40; Ex. 1002 ¶ 105) (emphasis added). Thus, Patent Owner's argument attacks the teachings of the references individually, whereas Petitioner relies on the combined teachings of the references to meet the claim limitation. A finding of obviousness, however, cannot be overcome "by attacking references individually where the [ground] is based upon the teachings of a combination of references." *See Bradium Techs. LLC v. Iancu*, 923 F.3d 1032, 1050 (Fed. Cir. 2019) (quoting *In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986)).

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 Liu and Jover in the manner proposed, with reasonable expectation of success, to meet the claim limitation.

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

For this limitation, Petitioner again points to Figure 6B of Xia, as annotated below (annotated to include a first channel, first radio signal, first time window, and time resource occupied by the first radio signal):



Xia, FIG. 6B (annotated); *Xia Provisional*, FIG. 6.

Pet. 30. As shown above, Petitioner annotates Xia Figure 6B to depict the first channel, first radio signal, and first time window, with an arrow pointing to a time resource occupied by the first radio signal at time t1. *Id.* (citing Ex. 1002 ¶ 109). Relying on the testimony of Dr. Bims, Petitioner contends that "[a] POSITA would have understood 'a time resource occupied by the first radio signal' to include a start time of the first radio signal." *Id.* (citing Ex. 1002 ¶ 110).

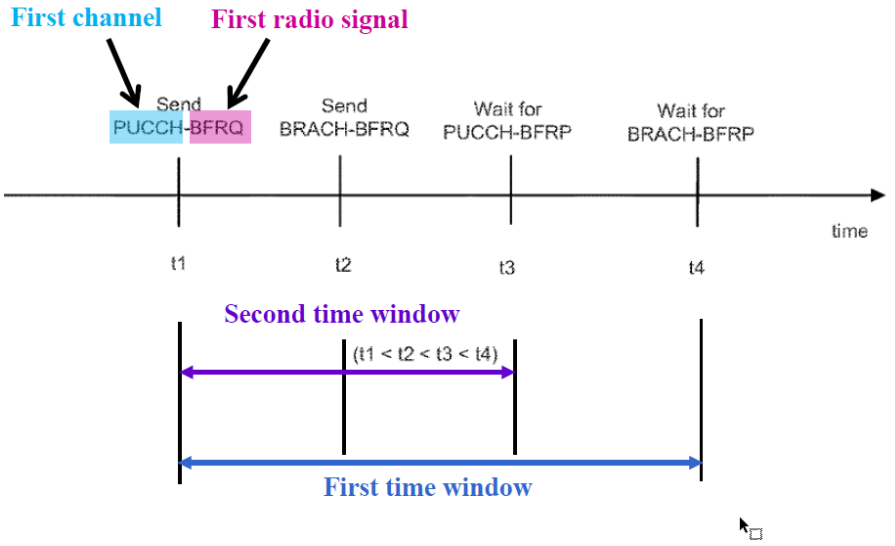
Patent Owner disputes this limitation for reasons discussed above with respect to limitation 1[d], arguing that because Xia does not disclose a "first time window," Xia also cannot disclose limitation 1[f]. Prelim. Resp.

20–21. We address this argument above and find it unavailing on this record.

At this stage, Petitioner persuades us that Xia discloses limitation [1f].

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

For this limitation, Petitioner again points us to Figure 6B of Xia, as annotated below (annotated to include a first channel, first radio signal, and first and second time windows):



Xia, FIG. 6B (annotated); *Xia Provisional*, FIG. 6.

Pet. 31–32. As shown above, Petitioner annotates Xia Figure 6B to show that a time resource occupied by the first radio signal (beginning at t1) is used for determining a second time window (a time window between t1 and t3). *Id.* (citing Ex. 1002 ¶¶ 112–113).

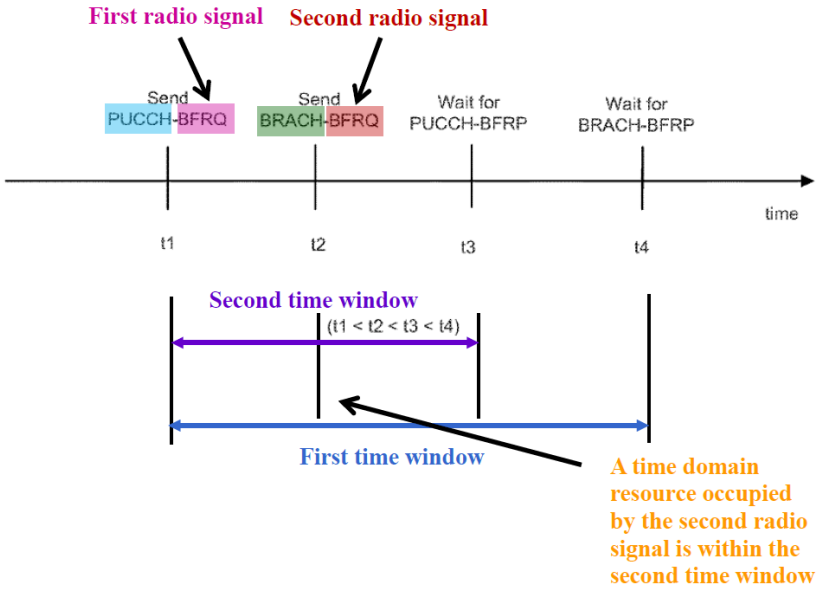
Patent Owner disputes this limitation for reasons discussed above with respect to limitation 1[d], arguing that because Xia does not disclose a "first time window," Xia also cannot disclose the "second time window" of

limitation 1[g]. Prelim. Resp. 22. We address this argument above and find it unavailing on this record.

At this stage, Petitioner persuades us that Xia discloses limitation [1g].

i. [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

For this limitation, Petitioner again relies on Xia Figure 6B, as annotated below (annotated to include first and second radio signals, first and second time windows, and a time domain resource occupied by the second radio signal within the second time window):



Xia, FIG. 6B (annotated); *Xia Provisional*, FIG. 6.

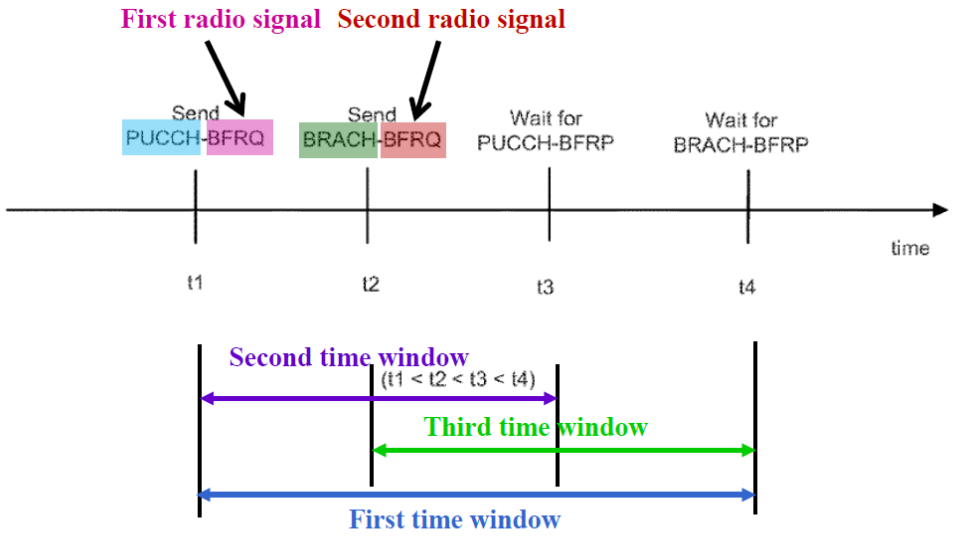
Pet. 33. As shown above, Petitioner's annotations indicate that a time domain resource occupied by the second radio signal (beginning at t2) is within the second time window (between t1 and t3), and that the second time window is within the first time window (between t1 and t4). *Id.* (citing Ex. 1002 ¶ 115).

Patent Owner disputes this limitation for reasons discussed above with respect to limitations 1[c] and 1[d], arguing that because Xia does not disclose a "second radio signal" or a "first time window," Xia also cannot disclose the "second radio signal" and "second time window" of limitation 1[h]. Prelim. Resp. 22–24. We address these arguments above and find them unavailing on this record.

At this stage, Petitioner persuades us that Xia discloses limitation [1h].

> *j. [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*

For this limitation, Petitioner again relies on Figure 6B of Xia, as annotated below (annotated to include first and second radio signals and first, second, and third time windows):



Xia, FIG. 6B (annotated); *Xia Provisional*, FIG. 6.

Pet. 34. As shown above, Petitioner's annotations depict that in Xia Figure 6B, a time domain resource occupied by the second radio signal (beginning

at t2 in Figure 6B) is used for determining a third time window (the time window between t2 and t4), and that the end time of the third time window (t4) is the end time of the first time window (t4). *Id.* (citing Ex. 1002 ¶ 116).

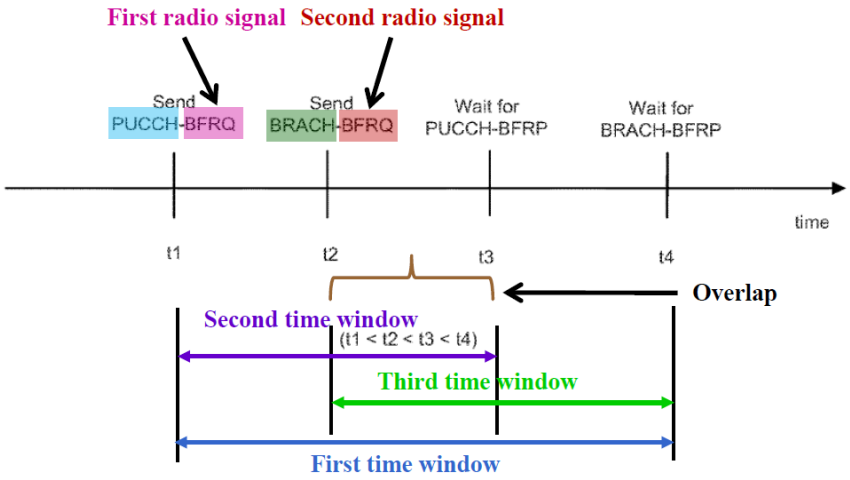
Patent Owner disputes this limitation for reasons discussed above with respect to limitation 1[c], arguing that because Xia does not disclose a "second radio signal," Xia also cannot disclose the "time domain resource occupied by the second radio signal" of limitation 1[i]. Prelim. Resp. 24. We address these arguments above and find them unavailing on this record.

Patent Owner also argues that because there are only two time windows in Xia, Xia cannot teach "the third time window" as required by limitation 1[i]. This argument is similar to its argument for limitation 1[d] ("first time window"), and we find it unavailing at this stage for similar reasons as explained above.

At this stage, Petitioner persuades us that Xia discloses limitation [1i].

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

Figure 6B of Xia is again the basis of Petitioner's argument for this limitation, which we reproduce again with Petitioner's annotations below (annotated to include first and second radio signals and first, second, and third time windows):



Xia, FIG. 6B (annotated); *Xia Provisional*, FIG. 6.

Pet. 35. As shown above, Petitioner annotates Xia Figure 6B to show that the PUCCH-BFRQ is sent followed by the PRACH-BFRQ, arguing that because the second BFRQ is sent at t2 before the UE stops waiting for PUCCH-BFRP at t3, there must be an overlap between the second time window (which ends at t3) and the third time window (which starts at t2). *Id.* at 36 (citing Ex. 1002 ¶ 120).

Patent Owner argues that because there are only two time windows in Xia, Xia cannot teach "the third time window" as required by limitation [1j]. Prelim. Resp. 26. This argument is similar to its argument for limitation 1[d] ("first time window"), and we find it unavailing at this stage for similar reasons as explained above.

At this stage, Petitioner persuades us that Xia discloses limitation [1j].

l. Petitioner's Expert Declaration

Relying on our recent precedential *Xerox* decision, Patent Owner also contends that we should not consider Dr. Bims's declaration because it is "almost entirely a word-for-word recitation of the Petition." Prelim. Resp. 34 (citing *Xerox Corp. v. Bytemar, Inc.*, IPR2022-00624, Paper 9 (PTAB

Aug. 24, 2022) (precedential); 37 C.F.R. § 42.65(a)). Patent Owner asserts that "[b]ecause Dr. Bims does not provide any independent analysis aside from copying the attorney arguments in the Petition and does not disclose the underlying facts or data upon which his opinions are based, his opinion should be entitled to no weight." *Id.*

We do not read *Xerox* to require us to give little weight to an expert declaration solely because some or all of it is also within the Petition. Rather, the Board in *Xerox* found a declaration entitled to little weight where the declaration "merely repeat[ed], *verbatim*, the conclusory assertion for which it is offered to support." *Xerox*, Paper 9 at 15. Patent Owner does not point to any specific statements in Dr. Bims's declaration that Patent Owner believes are conclusory, and thus, Patent Owner has not persuasively explained the applicability of *Xerox* here. Moreover, we will also be able to more fully assess the weight to be given to Dr. Bims's declaration in the context of a full trial record, which may include Dr. Bims's cross-examination testimony. Accordingly, at this stage, we decline Patent Owner's invitation to assign little weight to Dr. Bims's declaration.

m. 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.

4. *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. 26–27. 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.

5. *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. 27.

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.

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 grounds 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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