

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.

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IPR2023-00747  
Patent 10,951,271 B2

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Before JUSTIN T. ARBES, 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

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. 10,951,271 B2 (Ex. 1001, “the ’271 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 ’271 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 ’271 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-

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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. 74; Paper 5, 3.

The following *inter partes* review has also been filed against the ’271 patent: *Samsung Electronics Co. v. Apex Beam Technologies LLC*, IPR2023-00571 (PTAB filed March 29, 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. 73. Patent Owner identifies itself as the sole RPI. Paper 5, 2.

### *C. The ’271 patent*

The ’271 patent describes a scheme for multi-antenna transmission in a wireless communication system. Ex. 1001, 1:18–19. The ’271 patent explains that massive Multi-Input Multi-Output (MIMO) is a research hotspot of next-generation mobile communications. *Id.* at 1:23–25. In massive MIMO, multiple antennas use beamforming to form a relatively narrow beam which points to a particular direction to improve the quality of communication. *Id.* at 1:25–27. Hybrid beamforming, combining analog beamforming and digital precoding, has become an important research topic for New Radio Technology (NR) systems. *Id.* at 1:33–36.

The ’271 patent further explains that in a massive MIMO system, the base station can perform beam scanning over a period of time resources. *Id.* at 1:40–42. The User Equipment (UE) selects and reports the beam. *Id.* at 1:42–43. However, due to the limitation of air interface resources, the number of beams used for beam scanning and the number of beams reported by the UE are limited. *Id.* at 1:43–45. In addition, due to the uncertainty of

the UE location, the beam used for beam scanning does not necessarily include the beam that best serves the UE. *Id.* at 1:45–48. How to use the information reported by the UE to form the best beam to serve the UE service is a problem the '271 patent attempts to solve. *Id.* at 1:48–50.

In the disclosed method, “K antenna port groups are used to transmit [a] first wireless signal,” and “first signaling is used to determine the K antenna port groups,” where “K is a positive integer greater than 1.” *Id.* at 1:64–67. “[T]he K antenna port groups respectively correspond to K channel quality values,” which “are K non–negative real numbers,” and “the channel quality value is . . . Reference Signal Received Power (RSRP).” *Id.* at 1:67–2:2, 3:63–65. Similarly, “K1 antenna port groups of the K antenna port groups” correspond to “K1 channel quality values of the K channel quality values,” where K1 “is a positive integer less than or equal to the K.” *Id.* at 2:2–5.

Further, “a first proportional sequence corresponds to a ratio(ratios) among the K1 channel quality values,” and “the first information is used to determine . . . the K1 antenna port groups [and] the first proportional sequence.” *Id.* at 2:5–9. The “K1 channel quality values” include “a first channel quality [that] is a best channel quality value” and “a second channel quality [that] is a worse channel quality value,” and “a ratio between the second channel quality and the first channel quality is greater than or equal to [a] target threshold” determined from the first signaling. *Id.* at 2:9–16. When discussing antenna port groups, the '271 patent explains that an antenna port group may be “composed of one antenna port.” *Id.* at 2:45–46, 13:64–65.

*D. Challenged Claims*

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

1. A method for multi-antenna transmission in a user equipment (UE), comprising:

[1a] receiving, by the UE, a first signaling originating from a base station;

[1b] receiving, by the UE, a first wireless signal originating from the base station; and

[1c] transmitting, by the UE, first information to the base station;

[1d]

[1d1] wherein, K antenna port groups of the base station are used to transmit the first wireless signal;

[1d2] the first signaling is used by the UE to determine the K antenna port groups transmitting the first wireless signal received by the UE; the K is a positive integer greater than 1;

[1d3] the K antenna port groups respectively correspond to K channel quality values; the K channel quality values are K non-negative real numbers; the K channel quality values are Reference Signal Received Powers (RSRPs) or a Signal to Interference plus Noise Ratios (SINRs);

[1d4] K1 antenna port groups of the K antenna port groups correspond to K1 channel quality values of the K channel quality values; the K1 is a positive integer less than or equal to the K;

[1d5] a first proportional sequence corresponds to a ratio(ratios) among the K1 channel quality values;

[1d6] the first information is used to determine the K1 antenna port groups and the first proportional sequence;

[1d7] the first signaling is used to determine a target threshold; the target threshold is a non-negative real number;

[1d8] a first channel quality is a best channel quality value among the K1 channel quality values; a second channel quality is a worse channel quality value among the K1 channel quality values;

[1d9] a ratio between the second channel quality and the first channel quality is greater than or equal to the target threshold.

Ex. 1001, 27:14–47; *see* Pet. 9–36, Claims Appendix.

*E. Asserted Ground of Unpatentability*

Petitioner asserts the following ground of unpatentability (Pet. 8):

<b>Claim(s) Challenged</b>	<b>35 U.S.C. §<sup>1</sup></b>	<b>Reference(s)/Basis</b>
1–20	103	Kim, <sup>2</sup> Chen <sup>3</sup>

Petitioner also relies on the declaration of Dr. Apostolos K. Kakaes (Ex. 1003). 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. 25–32.

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<sup>1</sup> 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’s earliest claimed priority application was filed after March 16, 2013, so the AIA versions of §§ 102, 103 apply. Ex. 1001, code (30).

<sup>2</sup> U.S. Publication No. 2015/0036612 A1 to Kim, published Feb. 5, 2015 (Ex. 1027).

<sup>3</sup> WIPO Publication No. WO 2015/131494 A1 to Chen, published Sept. 11, 2015 (Ex. 1029). Exhibit 1029 is a certified translation of Chen (Exhibit 1028). We refer solely to Exhibit 1029 throughout this decision.

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;
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”).<sup>4</sup>

The Director’s Memo provides that “[c]onsistent with *Sotera Wireless, Inc.*,<sup>[5]</sup> 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

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<sup>4</sup> Available at [https://www.uspto.gov/sites/default/files/documents/interim\\_proc\\_discretionary\\_denials\\_aia\\_parallel\\_district\\_court\\_litigation\\_memo\\_20220621\\_.pdf](https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf).

<sup>5</sup> *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 at 18–19 (PTAB Dec. 1, 2020) (precedential).

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 Technologies LLC v. ZTE Corporation*, Case No. 2:22-cv-00031-JRG-RSP (E.D. Tex.))] the specific grounds [asserted in IPR2023-00571], 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. 1032, 1.

We determine that the language of this stipulation sufficiently comports with the language of 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.<sup>6</sup>

#### *B. Notice Ranking Petitions*

Petitioner filed two concurrent petitions (IPR2023-00571 and IPR2023-00747) challenging the patentability of claims 1–20 of the ’271 patent. Consistent with the Board’s practice for handling parallel petitions provided in the Consolidated Trial Practice Guide (“CTPG” or “Trial Practice Guide”),<sup>7</sup> Petitioner filed a Notice Ranking Petitions (Paper 2,

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<sup>6</sup> Patent Owner argues that we should not accept a late *Sotera* stipulation. Prelim. Resp. 32–34. We disagree that Petitioner’s *Sotera* stipulation is late. It is within our discretion to permit Petitioner to file a stipulation prior to institution. See *NXP USA, Inc. v. Impinj, Inc.*, IPR2021-01566, Paper 13 (PTAB Sept. 7, 2022) (precedential).

<sup>7</sup> Available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

“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 second and the -00571 petition first. Notice, 1. Petitioner’s justification for filing two petitions is based in part upon each petition relying on different prior art references with different priority dates, “which may result in a dispute regarding whether the references qualify as prior art.” *Id.* Petitioner explains that “[t]he ’271 patent claims priority to a Chinese Application filed December 28, 2016,” while the Park reference at issue in IPR2023-00571 was filed on February 3, 2016. *Id.* at 1–2. Accordingly, Petitioner contends, “if Patent Owner attempts to challenge the priority date of Park and/or contends that a prior art exception under 35 U.S.C. § 102(b) applies to remove Park as prior art, the Kim petition [IPR2023-00747] provides arguments based on Kim and Chen, each of which was published more than a year before the earliest claims priority date of the ’271 patent.” *Id.* at 3.<sup>8</sup> Petitioner also presents other reasons for filing two petitions, including that the obviousness grounds include material differences. *Id.* at 2.

The Trial Practice Guide provides that “multiple petitions by a petitioner are not necessary in the vast majority of cases” but acknowledges that “there may be circumstances in which more than one petition may be necessary, including, for example, . . . when there is a dispute about priority date requiring arguments under multiple prior art references.” CTPG 59. Although Patent Owner has raised no priority dispute at this stage, Petitioner

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<sup>8</sup> We omit both parties’ italicization of reference names throughout.

notes the potential for a dispute regarding whether the references qualify as prior art. Notice 1–2. Patent Owner has not stipulated that any of the references at issue in the -00571 petition qualify as prior art. *See* CTPG 61 (permitting a patent owner to “seek to avoid additional petitions by proffering a stipulation . . . that certain references qualify as prior art”). Thus, there exists the potential for a prior art dispute during trial.

Although we have discretion to deny a parallel petition under 35 U.S.C. § 314(a) (*see* CTPG 61), in light of the potential for a prior art dispute and Patent Owner’s silence on the matter, we decline to exercise that discretion here.

### *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. 8 (citing Ex. 1003 ¶ 81).

Patent Owner uses Petitioner’s proposed level of skill in the art at this stage. Prelim. Resp. 9. We are persuaded, on the present record, that Petitioner’s proposal is consistent with the problems and solutions in the ’271 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. 3; Prelim. Resp. 9. 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))).

However, for reasons explained below, we invite the parties to construe limitation [1d5] during trial.

*F. Asserted Obviousness over Kim and Chen*

Petitioner contends that claims 1–20 would have been obvious over the combination of Kim and Chen. Pet. 9–71.

1. *Overview of Kim*

Kim describes a method for a terminal carrying out a measurement report in a wireless communication system. Ex. 1027, code (57). Figure 12 of Kim is reproduced below:

FIG. 12

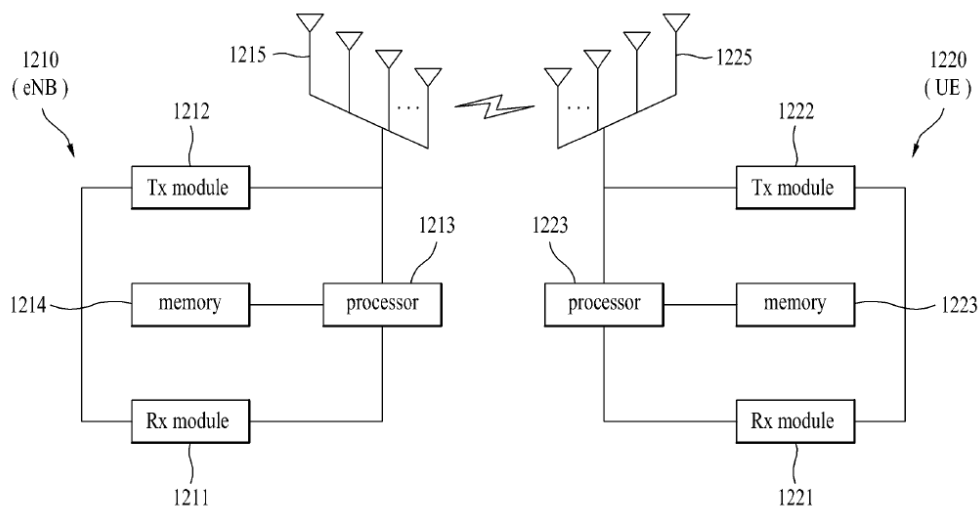


Figure 12 shows a UE device 1220 that includes an Rx module 1221, a Tx module 1222, and a plurality of antennas 1225, and a BS (base station) device 1210 that includes a reception (Rx) module 1211, a transmission (Tx) module 1212, and a plurality of antennas 1215. *Id.* ¶¶ 174, 177. The plurality of antennas of the base station and UE indicate the devices support MIMO transmission and reception. *Id.* ¶ 177.

## 2. *Overview of Chen*

Chen describes a channel information feedback method and pilot and beam transmission methods. Ex. 1029, 1. In Chen, a base station configures  $N$  pilot ports in  $M$  pilot ports for a terminal according to terminal information reported by the terminal. *Id.* at 11, Fig. 1. The terminal (UE) receives and detects pilot signals from the  $N$  pilot ports and detects the  $N$  pilot signals according to the port information to obtain received powers corresponding to the  $N$  types of pilot signals. *Id.* at 13. The terminal selects  $K$  pilot ports from the  $N$  pilot ports according to received signal quality, and feeds back channel information of channels formed by the  $K$  pilot ports, where the  $K$  pilot ports are selected according to a power threshold configured by the base station. *Id.* at 14.

## 3. *Independent Claim 1*

### *a. Undisputed limitations*

Petitioner asserts that, to the extent the preamble is limiting, Kim teaches the preamble by disclosing “a method for a terminal carrying out a measurement report in a wireless communication system.” Pet. 9 (citing Ex. 1027, code (57), 1; Ex. 1003 ¶¶ 96–98).

Petitioner contends that Kim discloses limitation [1a], “receiving, by the UE, a first signaling originating from a base station,” by describing that

its UE receives first signaling, for example, “RRC [Radio Resource Control] signaling” that includes “CSI-RS [Channel State Information-Reference Signal] config information element[s],” from a base station. *Id.* at 10–11 (citing Ex. 1027 ¶¶ 79–81; Ex. 1003 ¶¶ 99–103).

Petitioner also contends that Kim discloses limitation [1b], “receiving, by the UE, a first wireless signal originating from the base station,” by disclosing that its UE receives a first wireless signal, for example, a pilot signal or reference signal (e.g., cell-specific reference signal (“CRS”) or channel state information-reference signal (“CSI-RS”)), originating from the base station. *Id.* at 12 (citing Ex. 1027 ¶¶ 52, 57–64; Ex. 1003 ¶¶ 104–108).

Petitioner further contends that Kim discloses, or alternatively, that Kim and Chen render obvious, limitation [1d7], “the first signaling is used to determine a target threshold; the target threshold is a non-negative real number.” *Id.* at 30–35 (citing Ex. 1003 ¶¶ 136–143). Petitioner contends that Kim alone discloses that the RSRP-to-max(RSRP) ratio of each CSI-RS RSRP value is compared to a threshold value. *Id.* at 30 (citing Ex. 1027 ¶ 149; Ex. 1003 ¶ 137). Petitioner also contends that Chen discloses that its UE selects the K antenna ports “according to a power threshold,” such as “a relative threshold” (e.g., RSRP ratio), “configured by the base station.” *Id.* at 31 (citing Ex. 1029, 4, 5, 7, 9, 14–15). Petitioner further contends that a POSITA would have found it obvious “to have the base station configure the relative power threshold used in both Kim and Chen at the base station, as taught by Chen and suggested by Kim’s transmitting other threshold values for antenna port selection.” *Id.* at 32 (citing Ex. 1003 ¶ 139; Ex. 1027 ¶ 163; Ex. 1029, code (57), 11, 18, 21, 23). Petitioner also sets forth a detailed

rationale to combine Kim and Chen, with a reasonable expectation of success. *See id.* at 32–35.

Petitioner further contends that Kim discloses limitation [1d8], “a first channel quality is a best channel quality value among the K1 channel quality values; a second channel quality is a worse channel quality value among the K1 channel quality values,” by disclosing a first or “best” channel quality, e.g., “max(RSRP<sub>i</sub>)” or “best CSI-RS average Rx power level” among the selected M antenna ports. *Id.* at 35 (citing Ex. 1027 ¶¶ 136, 149; Ex. 1003 ¶¶ 144–146).

Finally, Petitioner contends that Kim discloses limitation [1d9], “a ratio between the second channel quality and the first channel quality is greater than or equal to the target threshold,” arguing that Kim discloses that a ratio between the second (“worse”) channel quality (RSRP<sub>n</sub>) and first (“best”) channel quality (max(RSRP<sub>i</sub>)) is greater than Equation 4’s target threshold. *Id.* at 36–37 (citing Ex. 1027 ¶¶ 136, 148–149; Ex. 1003 ¶¶ 147–148).

Patent Owner does not dispute Petitioner’s arguments regarding the preamble or these limitations at this stage; nor does Patent Owner dispute the combinability of Kim and Chen. We determine that on this record, Petitioner has made a sufficient showing that the combination of Kim and Chen discloses the preamble (whether or not limiting) and these limitations, and that one of ordinary skill in the art would have combined Kim and Chen, with a reasonable expectation of success.

- b. [1d1] wherein, *K* antenna port groups of the base station are used to transmit the first wireless signal; . . . [1d2] the *K* is a positive integer greater than 1

Patent Owner argues limitations [1d1] and a portion of limitation [1d2] together, so we also address them together. Prelim. Resp. 11–16.<sup>9</sup> For limitation [1d1], Petitioner argues that Kim, or alternatively, Kim and Chen, disclose this limitation. Pet. 16. Petitioner first contends that Kim’s base station transmits wireless signals “through 1, 2, 4, or 8 antenna ports” of the base station. *Id.* (citing Ex. 1027 ¶ 71; Ex. 1003 ¶ 113). Noting that the ’271 patent states that “the antenna port group” may be “composed of one antenna port,” Petitioner contends that each of Kim’s “antenna ports” is an “antenna port group” under the ’271 patent’s disclosure. *Id.* n.6 (citing Ex. 1001, 2:45–46, 13:64–65).

On this point, Patent Owner contends that Kim’s “antenna ports” do not disclose “*K* antenna **port groups**,” as “Kim distinguishes antenna port groups and singular antenna ports.” Prelim. Resp. 12–13 (citing Ex. 1027 ¶¶ 65, 74, 76. We find this argument unavailing, as Patent Owner does not sufficiently address the disclosure in the ’271 patent, cited by Petitioner in the Petition, that “the antenna port group [may] include[] only one antenna port.” Ex. 1001, 13:64–65; *see also id.* at 2:45–46. In particular, Patent Owner contends that the claim language explicitly requires “*K* is a positive integer **greater than 1**,” so “even if a group comprised one antenna port, there are still multiple (greater than 1) groups transmitting the claimed first wireless signal.” Prelim. Resp. 13–14. This argument is unavailing on this

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<sup>9</sup> We address the remainder of limitation [1d2], “the first signaling is used by the UE to determine the *K* antenna port groups transmitting the first wireless signal received by the UE,” in the next section.

record because Petitioner persuades us that Kim discloses transmitting multiple antenna ports—“through 1, 2, 4, or 8 antenna ports.” Ex. 1027 ¶ 71. As each port may be one group under the ’271 patent’s disclosure, this means that Kim discloses transmitting through “greater than 1” antenna port groups.<sup>10</sup>

Petitioner sets forth an alternative argument based on Kim for this limitation, which is that when a pair (group) of two CSI-RS antenna ports in Kim are “mapped to the same RE [resource element],” then each CSI-RS in the pair “may be identified by different orthogonal codes.” *Id.* at 18 (citing Ex. 1027 ¶ 76). Thus, Petitioner argues, Kim teaches that a CSI-RS may be an “antenna port group” having either (1) one port per group or (2) an antenna port pair having two antenna ports per group. *Id.* (citing Ex. 1027 ¶¶ 76, 141). Patent Owner does not address this argument. We find Petitioner’s alternative argument over Kim sufficiently persuasive for institution.

Petitioner also sets forth an alternative argument based on the combination of Kim and Chen for this limitation, which is that Chen discloses “N pilot ports are formed by virtualization of a same group of antennas,” which “a POSITA would have understood describes a group of antennas at a single base station.” Pet. 19 (citing Ex. 1029, 3, 5, 7, 11, 18; Ex. 1003 ¶ 117). Petitioner contends that “[a] POSITA would have found it obvious to configure Kim’s system such that the K antenna port groups transmit from a single base station so that the base station can provide

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<sup>10</sup> To the extent Patent Owner disagrees that the term “antenna port groups” should be interpreted as Petitioner argues, Patent Owner should make its claim construction position explicit during trial.

improved transmission to the UEs within its broadcast area.” *Id.* at 20 (citing Ex. 1003 ¶ 118). Petitioner sets forth further details regarding motivation to combine for this limitation with a reasonable expectation of success, which Patent Owner does not dispute at this stage. *Id.* at 20–22.

On this record, we find Petitioner’s arguments regarding the combination of Kim and Chen persuasive. Chen discloses that “N pilot ports are formed by virtualization of a same group of antennas,” which Dr. Kakaes testifies “a POSITA would have understood describes a group of antennas at a single base station.” *See* Pet. 19 (citing Ex. 1029, 3, 5, 7, 11, 18; Ex. 1003 ¶ 117). We find this testimony persuasive at this stage.

Patent Owner first argues that Chen does not cure the deficiencies of Kim because Petitioner concedes that “Chen describes the same transmission and reporting process as Kim.” Prelim. Resp. 14 (citing Pet. 18). We find this argument unavailing, as Petitioner relies on additional disclosure in Chen regarding antenna virtualization that is not present in Kim. *See, e.g.*, Pet. 19 (citing Ex. 1029, 3, 5, 7, 11, 18).

Patent Owner’s next argument is difficult to follow and may be better understood by first reading the following statement by Petitioner, made prior to discussing the disclosure of Chen:

Kim describes transmitting the first wireless signal from antenna ports at a [*sic*] one or more base stations. . . . *Although “a” means “one or more,” . . . to the extent Patent Owner argues that a single base station is required and that Kim does not disclose K antenna port groups of a single base station being used to transmit the first wireless signal, a POSITA would have found this obvious [over Chen].*

Pet. 18 (emphasis added). Patent Owner argues that the above statement by Petitioner “recogniz[es] that this aspect of Kim contravenes the plain claim

language of ‘K antenna port groups of *the base station* are used to transmit the first wireless signal.’” Prelim. Resp. 14. Continuing, Patent Owner states that “Petitioner’s argument that ‘a’ means ‘one or more’ is inapposite because the claim language, ‘the base station,’ is clearly in the singular form.” *Id.* That is, Patent Owner appears to argue that Kim does not disclose a single “base station” but then does not explain why this difference matters, as in the combination, Petitioner relies on Chen for “the base station.” *See* Pet. 18 (“Chen discloses . . . ‘a base station transmits . . . .’” (citing Ex. 1029, code (57), 3–5, 11, 18)). To the extent Patent Owner asserts that Kim does not disclose a limitation for which Petitioner relies on Chen instead, Patent Owner impermissibly argues the references individually. *In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986).

Patent Owner next argues that “Chen uses M pilot ports to transmit the same M amount of pilot signals, meaning that Chen discloses one pilot signal per pilot port, instead of the claimed ‘K antenna port groups of the base station are used to transmit the first wireless signal.’” Prelim. Resp. 14–15 (citing Ex. 1029, code (57), 3, 4, 6). Even where the concept of a grouping of antennas is disclosed in the context of antenna virtualization, Patent Owner argues, “Chen clarifies that *each pilot port* (*i.e.*, not antenna port groups) corresponds to a set of virtualized precoding weights.” *Id.* at 15–16 (citing Ex. 1029, 3, 6–9, 11, 15, 18, 20). “Moreover,” Patent Owner continues, “each of Chen’s virtualizations is configured to a singular ‘group’ of antennas, rather than the claimed multiple K antenna port *groups*, where ‘K is a positive integer greater than 1.’” *Id.* at 16.

Patent Owner does not sufficiently explain how Chen’s disclosure of virtualized precoding weights undermines Dr. Kakaes’s testimony regarding

Chen's virtualization disclosure. It is unclear, for instance, on this record how Patent Owner's emphasis on "virtualized precoding weights" undermines Chen's disclosure that "N pilot ports are formed by virtualization of a same group of antennas."

Finally, Patent Owner's point that Chen's virtualizations are configured to a singular group of antennas is inapposite because in the combination, Petitioner argues that Kim's system would have been configured to include the K antenna port groups based on Chen's virtualization teachings. Pet. 18–20. Kim discloses multiple antenna ports, and Chen discloses a group of antenna ports, resulting in a combination that achieves the claimed limitation, on this record. *See* Ex. 1003 ¶ 118.

For the portion of limitation [1d2] highlighted above, "the K is a positive integer greater than 1," Petitioner argues that Kim discloses "a positive integer greater than 1, for example, 2, 4, or 8 antenna ports." Pet. 23 (citing Ex. 1003 ¶ 123). Patent Owner responds that "Petitioner failed to specify where this required element of the claim is found in the prior art." Prelim. Resp. 13. We disagree. Petitioner sufficiently explains for institution purposes that Kim discloses a positive, plural number of integer antenna ports.

Accordingly, at this stage, Petitioner persuades us that Kim alone or the combination of Kim and Chen discloses limitations [1d1] and the portion of [1d2] addressed in this section.

*c. [1d2] the first signaling is used by the UE to determine the K antenna port groups transmitting the first wireless signal received by the UE*

We next address the remainder of limitation [1d2], "the first signaling is used by the UE to determine the K antenna port groups transmitting the

first wireless signal received by the UE.” Petitioner contends that Kim’s first signaling is used by the UE to determine the K antenna port groups used to transmit the CSI-RS first wireless signal received by the UE and identified in the Resource Block by the corresponding Resource Elements. Pet. 22–23 (citing Ex. 1003 ¶ 123).

Patent Owner raises similar arguments as for the previous limitations, which we find unavailing on this record. Prelim. Resp. 16–18. Patent Owner additionally argues that “Kim does not disclose any of the types of information that would be indicative of disclosing the claimed first signaling.” *Id.* at 18. Pointing to the ’271 patent specification’s disclosure of quasi-co-located (QCL) information as the claimed “first signaling,” Patent Owner contends that Kim lacks a description of such QCL information. *Id.* (citing Ex. 1001, 6:44–49).

At this stage, Petitioner persuades us that Kim discloses this limitation. On this record, Kim discloses the first signaling information as explained above for limitation [1a], which Patent Owner does not challenge. Further, we agree on this record that Kim’s UE uses this signaling information to determine the K antenna port groups used to transmit the CSI-RS first wireless signal received by the UE and identified in the Resource Block by the corresponding Resource Elements. Pet. 22–23 (citing Ex. 1003 ¶ 123). Patent Owner’s argument based on disclosed but not claimed QCL information is unavailing.<sup>11</sup>

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<sup>11</sup> To the extent Patent Owner is relying on an implicit claim construction of “first signaling,” Patent Owner should make this construction explicit during trial. However, we note that the QCL disclosure Patent Owner relies on is couched in “embodiment” language and, without more, does not warrant limiting the claims. *See* Prelim. Resp. 18 (citing Ex. 1001, 6:44–49).

- d. [1d3] the  $K$  antenna port groups respectively correspond to  $K$  channel quality values; the  $K$  channel quality values are  $K$  non-negative real numbers; the  $K$  channel quality values are Reference Signal Received Powers (RSRPs) or a Signal to Interference plus Noise Ratios (SINRs);  
[1d4]  $K1$  antenna port groups of the  $K$  antenna port groups correspond to  $K1$  channel quality values of the  $K$  channel quality values; the  $K1$  is a positive integer less than or equal to the  $K$ ;  
[1d5] a first proportional sequence corresponds to a ratio(ratios) among the  $K1$  channel quality values*

Patent Owner argues limitations [1d3] through [1d5] together, so we likewise address them together.<sup>12</sup> Prelim. Resp. 19–22.

For limitation [1d3], Petitioner contends that “Kim discloses that each antenna port transmitting the CSI-RSs has a corresponding channel quality value, e.g., RSRP.” Pet. 25 (citing Ex. 1027 ¶¶ 111, 132, 135, 148–149; Ex. 1003 ¶ 127). Petitioner further contends, “RSRP is measured in milliwatts (mW), which are non-negative real numbers.” *Id.* (citing Ex. 1027 ¶ 135; Ex. 1003 ¶ 127). Although Patent Owner’s argument groups this limitation together with limitations [1d4] and [1d5], Patent Owner does not appear to specifically dispute limitation [1d3].

For limitation [1d4], Petitioner argues that “Kim discloses measuring  $K$  antenna port groups (e.g., management set of  $N$  antenna ports) that have real, non-negative RSRP channel quality values.” *Id.* at 27. According to

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<sup>12</sup> Limitations [1d3] through [1d5] constitute a large block of text. To the extent possible during trial, for clarity, the Board requests Patent Owner to address individual limitations separately in its briefing, preferably under separate headings. For consistency, Patent Owner should also follow Petitioner’s claim element numbering.

Petitioner, Kim’s measurement set of M antenna port groups is included within the N channel quality values because “a maximum of M CSI-RSs . . . from among [the] N CSI-RSs contained in the CoMP management set” is reported by the UE to the base station. *Id.* (citing Ex. 1027 ¶ 149).

Continuing, Petitioner argues, the M reported RSRP values (measurement set) correspond to the K1 antenna port groups that satisfy a threshold measurement. *Id.* (citing Ex. 1027 ¶¶ 111, 136, 149).

Patent Owner contends that “Kim’s RSRPs are keyed to reported antenna ports, and not an antenna port group, let alone the claimed ‘K1 antenna port *groups*.’” Prelim. Resp. 20. This argument relies on Patent Owner’s earlier argument for limitation [1d1], which we preliminarily reject above.

For limitation [1d5], Petitioner points to Kim’s disclosure of reporting the K1 antenna ports that satisfy “the RSRP ratio” of a received port that “is higher than a predetermined threshold value” when compared to the maximum received RSRP. Pet. 28 (citing Ex. 1027 ¶¶ 149, 136; Ex. 1003 ¶ 132). Specifically, Petitioner argues, Kim discloses the indexes and RSRP values “of a maximum of M [CSI-RSs] configured to satisfy Equation 4 may be reported”:

$$\text{RSRP}_n / \max(\text{RSRP}_i) > \text{Threshold}$$

*Id.* (citing Ex. 1027 ¶¶ 149, 136). According to Petitioner, this equation results in ratios that comprise a first proportional sequence:

[a] POSITA would have understood that, because each of the RSRP values of the reported antenna ports (K1 antenna ports) satisfies Equation 4’s threshold ratio, the corresponding ratios comprise a first proportional sequence among the reported (K1) channel quality RSRP values because they would be compared against the measured values to determine which are above the

threshold requirement to determine “a maximum of M” to be reported, thus creating a sequence.

*Id.* (citing Ex. 1003 ¶ 132).

Patent Owner contends that Kim’s equation 4 “is in apposite to the creation of a sequence of ratio(s).” Prelim. Resp. 20 (citing Ex. 1027 ¶ 149). This equation does not create a “proportional *sequence*,” Patent Owner contends, because the specification of the ’271 patent makes “clear that the embodiment utilizing channel quality values of RSRP would create a proportion of one RSRP to all the other RSRPs in the K1 subset of antenna port groups to create a proportional sequence (*i.e.*, a sequence comprising ratios between channel quality values ***other than the best channel quality value***.” *Id.* at 20–21 (citing Ex. 1001, 4:29–36, 24:18–31).

On this record, we find Petitioner’s argument more convincing, as Dr. Kakaes persuasively testifies at this stage that Kim’s equation 4 would result in the claimed proportional sequence. Ex. 1003 ¶ 132. Patent Owner’s argument to the contrary is unavailing because Patent Owner attempts to import unclaimed embodiments from the ’271 patent specification. *See id.* Prelim. Resp. 20–21. The portions of the specification Patent Owner relies on are couched in “embodiment” language, which on this record, is not shown to be limiting. *See id.* (citing Ex. 1001, 4:29–36 (“In one embodiment”), 24:15–31 (“In Embodiment 9”)).

We note, however, that the parties have not addressed in detail the meaning of limitation [1d5], including the meaning of the terms “proportional” and “corresponds.” It is unclear, for example, if the word “corresponds” in “first proportional sequence corresponds to a ratio(ratios)” means that the first proportional sequence *is* merely a sequence of ratios. It is also unclear whether the word “proportional” imposes an additional, as yet

unspecified, requirement for the sequence of ratios, or what quantity the sequence may be proportional to. We invite the parties to construe limitation [1d5] during trial.

Thus, at this stage we agree with Petitioner that Kim discloses limitations [1d3] through [1d5].

*e. [1d6] the first information is used to determine the K1 antenna port groups and the first proportional sequence [and] [1c] transmitting, by the UE, first information to the base station*

Patent Owner argues limitations [1d6] and [1c] together, so we also address them together. Prelim. Resp. 22–24. For limitation [1c], Petitioner argues that “Kim’s UE transmits a ‘measurement report’ containing first information, such as antenna port indices, RSRP values, RSRP-to-max(RSRP) ratios, and other information of the CRS and/or CSI-RS wireless signals to the base station.” Pet. 15 (citing Ex. 1027 ¶¶ 105–106, 110–111, 136, 149). For limitation [1d6], Petitioner refers back to limitation [1d5], arguing that

As explained for [1d5], the first information, such as antenna port indices, RSRP values, and RSRP-to-max(RSRP) ratios, is used to determine the M reported antenna port groups satisfying the threshold of Equation 4 (K1 antenna port groups) and the first proportional sequence of RSRP-to-max(RSRP) values, such as determined using Equation 4.

Pet. 29–30 (citing Ex. 1003 ¶ 135).

Patent Owner argues that Kim does not disclose a “first proportional sequence” or “a subdivision of antenna port groups from K into K1.” Prelim. Resp. 23. “[E]ven if Kim’s CSI-RS configuration is for an antenna port group,” Patent Owner argues, “RSRPs are ‘respectively measured’ for each antenna port.” *Id.* (citing Ex. 1027 ¶ 138). We preliminarily reject

similar “antenna port groups” and “proportional sequence” arguments above. On this record, we agree with Petitioner that Kim discloses limitations [1c] and [1d6].

*f. Petitioner’s Expert Declaration*

Relying on our recent precedential *Xerox* decision, Patent Owner also contends that we should give “no weight” to Dr. Kakaes’s declaration because it is “almost entirely a recitation of the Petition.” Prelim. Resp. 32 (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. Kakaes provides nearly no 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. Kakaes’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. Kakaes’s declaration in the context of a full trial record, which may include Dr. Kakaes’s cross-examination testimony. Accordingly, at this stage, we decline Patent Owner’s invitation to assign little weight to Dr. Kakaes’s declaration.

*g. 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 the combination of Kim and Chen.

*4. Independent Claims 6, 11, 16*

Petitioner sets forth similar arguments for independent claims 6, 11, and 16 as for claim 1. *See* Pet. 56–71. Patent Owner relies on the same arguments for these claims as it does for claim 1. Prelim. Resp. 24. For similar reasons as discussed above, Petitioner has shown a reasonable likelihood that claims 6, 11, and 16 would have been obvious over the combination of Kim and Chen.

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

Petitioner contends that dependent claim 2–5, 7–10, 12–15, and 17–20 would have been obvious over Kim or the combination of Kim and Chen. Pet. 37–55, 57, 64, 71. Petitioner provides a detailed analysis explaining where the combination of Kim and Chen discloses or suggests the limitations in these dependent claims, which Patent Owner does not contest at this stage. Prelim. Resp. 24–25.

We leave for trial the issue of whether Petitioner establishes that Kim or the combination of Kim and Chen 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 '271 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.

IPR2023-00747  
Patent 10,951,271 B2

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