

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

APEX BEAM TECHNOLOGIES LLC,
Patent Owner.

IPR2025-00898
Patent 10,951,271 B2

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

Apple Inc. (“Petitioner”) filed a Petition (Paper 3, “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 11, “Prelim. Resp.”). Patent Owner’s request for discretionary denial was denied and the Petition was forwarded to the Board. Paper 13.

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. *See* 35 U.S.C. § 314(a). Accordingly, we institute an *inter partes* review with respect to all challenged claims and challenges asserted in the Petition. 37 C.F.R. § 42.108(a).

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

II. BACKGROUND

A. Related Matters

The Petition is substantially similar to a petition filed by Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc., IPR2023-00747 (“the Samsung IPR”). The Samsung IPR proceeded to oral hearing and settled shortly thereafter. *See* IPR2023-00747, Papers 26, 29. Thus, the Board did not issue a Final Written Decision in the Samsung IPR.

The parties identify additional related matters in their respective papers. Pet. 70–71; Paper 7, 2.

B. Real Parties-in-Interest

Apple Inc. identifies itself as the only real party-in-interest (RPI). Pet. 70. Patent Owner identifies itself as the sole RPI. Paper 7, 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.

The '271 patent provides a method for multi-antenna transmission in a UE, in part, by transmitting a wireless signal using K antenna port groups. *Id.* at 1:59–65. The '271 patent explains that an antenna port group may be

“composed of one antenna port” or “a plurality of antenna ports.” *Id.* at 2:45–48, 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:

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

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

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

[1.d]

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

[1.d2] 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;

[1.d3] 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);

[1.d4] 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;

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

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

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

[1.d8] 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;

[1.d9] 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. v–vi.

E. Asserted Challenge of Unpatentability

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

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

Petitioner also relies on the declaration of Dr. Robert Akl (Ex. 1003).

Patent Owner has not submitted declaration testimony at this stage.

III. ANALYSIS

A. Level of Ordinary Skill in the Art

We review the challenges of unpatentability in view of the understanding of a person of ordinary skill in the art at the time of the invention. *See Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17–18 (1966). Petitioner asserts that

A person of ordinary skill in the art . . . (“POSITA”) would have had a bachelor’s degree in electrical engineering, computer engineering, computer science, or a similar field,

¹ U.S. Publication No. 2015/0036612 A1 to Kim, published Feb. 5, 2015 (Ex. 1004).

² WIPO Publication No. WO 2015/131494 A1 to Chen, published Sept. 11, 2015 (Ex. 1006). Exhibit 1006 is a certified translation of Chen (Exhibit 1005). We refer solely to Exhibit 1006 throughout this decision.

along with two years of experience designing or developing wireless networks, including long-term evolution LTE/4G or 5G new radio (NR) cellular technology. . . . Additional years of experience could substitute for an advanced-level degree (and vice versa).

Pet. 4 (citing Ex. 1003 ¶¶ 10, 16, 29–32). Patent Owner uses Petitioner’s proposed level of skill in the art at this stage. Prelim. Resp. 6.

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 at this stage.

B. Claim Construction

The parties do not propose any explicit claim constructions. *See* Pet. 4–6; Prelim. Resp. 6. As no terms are in dispute, we do not construe any terms.

Petitioner discusses constructions proposed by Patent Owner in the Samsung IPR, but Patent Owner does not rely on those constructions here. Pet. 4–6 (citing IPR2023-00747, Paper 14 at 11–13). We therefore do not address them at this stage.

C. Asserted Obviousness over Kim and Chen

Petitioner contends that claims 1–20 would have been obvious over the combination of Kim and Chen. Pet. 6–69.

1. Independent Claim 1

Patent Owner disputes Petitioner’s showing for limitations [1.d5] and [1.d6]. Prelim. Resp. 9–11. We first address the limitations disputed by Patent Owner and then turn to the undisputed limitations.

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

For limitation [1.d5], Petitioner points to Kim’s disclosure of reporting the K1 antenna ports that satisfy an RSRP ratio higher than a threshold when compared to the maximum received RSRP. Pet. 32 (citing Ex. 1004 ¶¶ 149, 136). To qualify for this reporting, Petitioner argues, an assessment is made of the following equation:

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

Id. (citing Ex. 1004 ¶¶ 149, 136). According to Petitioner, Kim reports indexes of a maximum of M channel state information reference signals (CSI-RSs) and also the RSRP estimation result of the corresponding CSI-RS. *Id.* at 32–33 (citing Ex. 1004 ¶ 149). Both the indexes and the RSRP estimation results qualify as the claimed proportional sequence, Petitioner argues. *Id.* at 33.

After considering Patent Owner’s arguments, which we address below, we agree with Petitioner at this stage that Kim discloses limitation [1.d5].

Patent Owner contends that Petitioner fails to show how Kim discloses the claimed “proportional sequence.” Prelim. Resp. 9. First, Patent Owner contends that “indexes of antenna port groups with RSRP measurement values higher than a certain threshold *are not a sequence of ratios,*” but rather, just an identification of antenna port groups. *Id.* (emphasis added). We disagree, on this record. The flaw in this reasoning is that the claim does not require the first proportional sequence to be a sequence of ratios. Rather, the claimed “first proportional sequence” merely “*corresponds to . . . ratios.*” Thus, Patent Owner’s argument that the indexes

“are not a sequence of ratios” is not commensurate with the scope of the claim. Petitioner persuades us, at this stage, that the indexes *correspond* to ratios (e.g., $\text{RSRP}_n/\max(\text{RSRP}_i)$). *See* Pet. 32–33.

Patent Owner next disputes that Kim’s “RSRP estimation result” is the claimed “proportional sequence” because Kim explains that this result is a single RSRP value. Prelim. Resp. 10 (citing Ex. 1004 ¶ 150). In Patent Owner’s view, a singular RSRP value is not a ratio among the K1 channel quality values (“e.g., a ratio between different RSRPs”) and therefore does not disclose the “proportional sequence.” *Id.*

Petitioner has the better argument at this stage. According to Petitioner, “[t]he sequence of these RSRP estimation results is based on the RSRP ratios (e.g., ‘ $\text{RSRP}_n/\max(\text{RSRP}_i)$,’ . . . such that the sequence would be proportional.” Pet. 33 (citing Ex. 1004 ¶ 149) (emphasis omitted). Petitioner further cites Kim as teaching that each measurement report value “may be defined as [a] ratio,” and so “the sequence of these RSRP estimation results” also teaches the claimed “proportional sequence [that] corresponds to . . . ratios.” *Id.* at 33–34 (citing Ex. 1004 ¶¶ 106, 136). At this stage, Petitioner’s citations to Kim suggest that contrary to Patent Owner’s argument, Kim’s RSRP estimation results are ratios and that there are multiple of them, thereby forming a “proportional sequence [that] corresponds to . . . ratios” as claimed.

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

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

Patent Owner's argument for this limitation depends on its argument for limitation [1.d5]. Prelim. Resp. 11. As we disagree with Patent Owner at this stage that Kim and Chen fail to disclose limitation [1.d5], we also disagree with Patent Owner that its argument for limitation [1.d6] undermines Petitioner's persuasive showing.

Based on the current record, we agree with Petitioner that Kim discloses limitation [1.d6].

c. *Undisputed Limitations*

Petitioner asserts that the combination of Kim and Chen discloses the preamble and the remaining limitations of claim 1. Pet. 6–69. Petitioner identifies where the combination of Kim and Chen teaches these limitations, supported with testimony from Dr. Akl, which Patent Owner does not specifically rebut at this stage. *Id.*

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

d. Summary as to Claim 1

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

2. Independent Claims 6, 11, and 16

Petitioner sets forth similar arguments for independent claims 6, 11, and 16 as for claim 1. *See* Pet. 56–69. Patent Owner relies on the same arguments for these claims as it does for claim 1. Prelim. Resp. 11–12. 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.

3. 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 and Chen. Pet. 39–69. 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 specifically contest at this stage. Prelim. Resp. 12.

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. *See* 37 C.F.R. § 42.108(a).

IV. CONCLUSION

At this stage of the proceeding, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing on its challenge 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 challenges of unpatentability set forth in the Petition; and

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

IPR2025-00898
Patent 10,951,271 B2

FOR PETITIONER:

W. Karl Renner
Craig Deutsch
Yao Wang
FISH & RICHARDSON P.C.
axf-ptab@fr.com
deutsch@fr.com
ywang@fr.com

FOR PATENT OWNER:

Vincent Rubino
Peter Lambrianakos
Enrique Iturralde
Julian Pymonto
Jacob Ostling
FABRICANT LLP
vrubino@fabricantllp.com
plambrianakos@fabricantllp.com
eiturralde@fabricantllp.com
jpymonto@fabricantllp.com
jostling@fabricantllp.com