

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD., APPLE INC., AND
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioners,

v.

SMART MOBILE TECHNOLOGIES LLC,
Patent Owner.

IPR2022-01002
Patent 9,191,083 B1

Before JAMESON LEE, NATHAN A. ENGELS, and
PAUL J. KORNICZKY, *Administrative Patent Judges*.

ENGELS, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining No Challenged Claim Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

A. Background

Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Apple Inc. (collectively, “Petitioner”) filed a Petition requesting an *inter partes* review of claims 1–9 and 12–20 of U.S. Patent No. 9,191,083 B1 (Ex. 1001, Ex. 2009, “the ’083 patent”). Paper 3, 1 (“Pet.”). Petitioner also filed the Declaration of Dr. Michael Allen Jensen in support of the Petition. Ex. 1003.

Petitioner additionally filed Petitioner’s Notice of Ranking Petitions and Explaining Material Differences Between Petitions for U.S. Patent No. 9,191,083 B1, identifying the Petition as its first-ranked petition and identifying a second petition challenging the ’083 patent filed in IPR2022-01003 as its second-ranked petition. Paper 2, 2.

Smart Mobile Technologies LLC (“Patent Owner”) filed a Preliminary Response addressing only Petitioner’s Notice of Ranking Petitions and requesting denial of the petition in IPR2022-01003 and did not substantively address Petitioner’s contentions advanced in the Petition in this proceeding, IPR2022-01002. Paper 7.

The Board issued a Decision Granting Institution. Paper 9.¹ Patent Owner filed a Response. Paper 24 (“PO Resp.”). Patent Owner also filed the Declaration of Professor Todor V. Cooklev, Ph.D. in support of Patent Owner’s Response. Ex. 2004. Petitioner filed a Reply to Patent Owner’s Response. Paper 29 (“Pet. Reply”). Petitioner also filed the Second Declaration of Dr. Michael Allen Jensen in support of its Reply. Ex. 1051.

¹ The Board separately issued a Decision Denying Institution in IPR2022-01003.

And Patent Owner filed a Sur-Reply to Petitioner's Reply. Paper 36 ("Sur-Reply").

A hearing was held on September 22, 2023. A copy of the hearing transcript has been entered. Paper 40 ("Tr.").

B. Real Parties in Interest

Petitioner states that Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Apple Inc. are the real parties-in-interest. Pet. 88. Patent Owner identifies Smart Mobile Technologies LLC. Paper 5, 1.

C. Related Proceedings

The parties state that the '083 patent is the subject of *Smart Mobile Technology LLC v. Samsung Electronics Co., Ltd. et al.*, 6:21-cv-00701 (W.D. Tex.) and *Smart Mobile Technologies LLC v. Apple Inc.*, 6-21-cv-00603 (W.D. Tex.). Pet. 88–89; Paper 5, 1. Patent Owner also identifies *Samsung Electronics Co., Ltd. v. Smart Mobile Technologies LLC*, IPR2022-01003 (PTAB). Paper 5, 1.

D. The '083 Patent (Ex. 1001)

The '083 patent describes a wireless device for multichannel data transfer featuring a cellular telephone/mobile wireless device equipped with multiple transmitters and receivers coupled with multiple antennas. Ex. 1001, 1:43–57. According to the '083 patent, having multiple transmitters and receivers and multiple antennas enhances the system's capabilities to differentiate between various signals or to combine multiple paths into a single communication channel. Ex. 1001, 4:6–9, 30–36.

E. Representative Claim

Of the challenged claims, claims 1, 5, 8, and 12 are independent claims. Claim 1 is reproduced below (with Petitioner's bracketing).

- 1[pre] A network box which is portable and wireless enabled comprising:
 - 1[a] a plurality of antennas;
 - 1[b] a plurality of ports; and
 - 1[c] a communication component coupled to the plurality of antennas, the communication component including a processor, a transmitter, and a receiver,
 - 1[d] the communication component configured to transmit a first data stream by simultaneously transmitting a first plurality of signal streams using the plurality of antennas, the first plurality of signal streams collectively representing the first data stream,
 - 1[e] the communication component configured to receive a second data stream by simultaneously receiving a second plurality of signal streams using the plurality of antennas and generating the second data stream from the second plurality of signal streams;
 - 1[f] wherein the communication component is configured to communicate via a first frequency band using a wireless communication protocol;
 - 1[g] wherein the device is configured to process the first data stream and the second data stream in parallel and to process multiple channels; and
 - 1[h] wherein the portable network box device is configured to transmit and receive a plurality of data from and to a separate network switch box over at least one network path.

F. Asserted Challenges to Patentability

Petitioner challenges the patentability of claims 1–9 and 12–20 of the '083 patent on the following grounds:

Claim(s) Challenged	35 U.S.C. §	References/Basis
1–9, 12–20	103 ²	Paulraj, ³ Heath ⁴

Pet. 1.

II. DISCUSSION

A. Obviousness

Under 35 U.S.C. § 103, a claim is unpatentable as obvious if “the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains.” *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). 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).

² The '083 patent's earliest priority date falls after the Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, 125 Stat. 284 (2011), took effect. Thus, we apply the AIA version of § 103.

³ US 6,351,499 B1; Feb. 26, 2002. Ex. 1004.

⁴ WO 2010/111433 A2; Sept. 30, 2010. Ex. 1005.

B. 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 contends a person of ordinary skill would have had a “Bachelor’s degree in electrical engineering, computer engineering, computer science, or a related field, and at least two years of experience related to the design or development of wireless communication systems, or the equivalent.” Pet. 2–3 (citing Ex. 1003 ¶¶ 27–28). Petitioner additionally states that “[a]dditional graduate education could substitute for professional experience, or significant experience in the field could substitute for formal education.” Pet. 3. Patent Owner does not address the level of ordinary skill.

Based on the evidence of record, including the testimony of Dr. Jensen, we determine a person of ordinary skill would have had a bachelor’s degree in electrical engineering, computer engineering, computer science, or a related field, and two years of experience related to the design or development of wireless communication systems. This is consistent with Petitioner’s articulation of the level of ordinary skill, with the exception of the open-ended reference to “at least” two years of experience, which could be read to include people with extraordinary levels of experience and skill.

C. Claim Construction

We construe claims 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) (2021).

Among other terms, the parties dispute the scope of the “plurality of antennas” as recited in several limitations in each independent claim. Because we determine the parties’ dispute regarding the “plurality of antennas” limitations is dispositive, we address the parties’ positions below.

D. Alleged Obviousness Based on Paulraj and Heath

Petitioner includes a claim-by-claim, limitation-by-limitation comparison of claims 1–9 and 12–20 to the combination of Paulraj and Heath (Pet. 18–87) along with reasons for combining the references’ teachings (Pet. 8–18).

1. Petitioner’s Combination of Paulraj and Heath

Petitioner cites Paulraj as describing, among other things, a system including a network box that transmits and receives using multiple antennas. Pet. 4. Petitioner states that “Paulraj does not expressly disclose (1) portability of its network box (1[pre], 16), (2) processing of its multiple data streams/channels in parallel (1[g], 4, 5[h], 5[i], 8[h], 12[i], 12[g], 19), and (3) a larger network environment with IP communications (3, 6, 8[j], 13),” and Petitioner contends Heath teaches those features. Pet. 8.

Petitioner presents multiple reasons why a person of ordinary skill in the art would have modified Paulraj’s wireless communication system based on Heath’s teachings. Pet. 8–14. Among other reasons, Petitioner contends a person of ordinary skill would have been motivated to apply Heath’s techniques related to portability, parallel processing, and IP networking for the purpose of improving Paulraj’s system and better achieving its intended

operations of “maximizing a communication parameter, such as data capacity, signal quality or throughput of a channel between a transmit unit with M transmit antennas and a receive unit with N receive antennas.”

Pet. 9–10 (quoting Ex. 1004, 3:42–47).

2. The Petition Fails to Show that Paulraj Satisfies the Claimed “Plurality of Antennas” Limitations

Each independent claim recites “a plurality of antennas” and transmitting and receiving signal streams “using the plurality of antennas.” The Petition does not directly address the scope of the recited plurality of antennas, but for claim 1, for example,⁵ Petitioner states for limitation 1[a] that “Paulraj’s wireless modem unit includes ‘N antennas 34A, 34B, . . . , 34N in its array 20 for receiving signals RS’ and ‘a number of transmit antennas 18A, 18B, . . . , 18M.’” Pet. 20 (citing Ex. 1004, 6:26–49; 3:43–58, 5:56–58; Ex. 1003 ¶ 81). For limitation 1[c], Petitioner states “Paulraj’s receive unit (*communication component*) includes data processing block 38 (*processor*) that is coupled to ‘N antennas 34A, 34B, . . . , 34N in its array 20’ (*antennas*)” and “[s]imilarly, Paulraj’s transmit unit (*communication component*) includes data processing block 28 (*processor*) that is coupled to ‘a number of transmit antennas 18A, 18B, . . . , 18M’ (*antennas*).” Pet. 24 (citing Ex. 1004, 6:26–36, 6:37–49, 6:50–9:21, 9:22–10:65, Figs. 1–3; Ex. 1003 ¶ 87).

⁵ Both parties address claim 1 as exemplary and state that all challenged claims include similar limitations. PO Resp. 5, n.2 (“Independent claims 5, 8, and 12 recite similar limitations. While this section presents the argument in the context of claim 1, the same argument also applies to the remaining independent claims 5, 8, 12, and their dependents.”); Pet. Reply 2 (“Claims 5, 8, and 12 include similar limitations.”).

For limitation 1[d], Petitioner states “Paulraj’s transmit unit (*communication component*) *simultaneously* transmits the transmit signals $TS_p \dots$ (*a first plurality of signal streams*) using multiple transmit antennas TA (*plurality of antennas*).” Pet. 26 (citing Ex. 1003 ¶¶ 92–93). And for limitation 1[e], Petitioner states “Paulraj’s receive unit (*communication component*) is capable of *simultaneously* receiving the receive signals RS_j (*second plurality of signal streams*) using multiple receive antennas (*plurality of antennas*).” Pet. 28 (citing Ex. 1004, 9:46–48; Ex. 1003 ¶¶ 95–96). Petitioner’s annotated version of Paulraj’s Figures 1 and 2, copied below, illustrates Petitioner’s contentions:

Unit 14 having Receivers 36 connected to Antennas 34A through 34N (described by Paulraj as antenna array 20). Petitioner’s annotated version of Paulraj’s Figure 1 depicts a Base Transceiver Station 12 having transmit antennas 18A, 18B, . . . , 18M in antenna array 16 and receive units 14A, 14B, 14C, and 14D, each having an antenna array 20 (Ex. 1004, 5:49–61), with arrows added by Petitioner to depict uplink and downlink communication between the Base Transceiver Station 12 and receive unit 14D. Petitioner additionally added dashed lines labeled Uplink Communication between receive unit 14D in Figure 1 and Transmit Unit 12 of Figure 2 and dashed lines labeled Downlink Communication between receive unit 14D in Figure 1 and Receive Unit 14 in Figure 2.

Patent Owner contends that Paulraj uses different sets of antennas for transmitting and receiving but “[t]he plain meaning of the claims requires that the same ‘plurality of antennas’ be used for transmitting and receiving the plurality of signal streams.” PO Resp. 5, 9–12. According to Patent Owner, “a [person of ordinary skill in the art] would understand that the claimed invention, by using the term ‘the’ in describing the plurality of antennas used in transmitting the first signal streams and receiving the second signal stream, clearly intended that the same receiving ‘antennas’ perform both functions.” PO Resp. 6 (citing Ex. 2004 ¶ 33). Further, citing Dr. Cooklev’s testimony, Patent Owner contends that the ’083 patent’s Specification describes embodiments that use the same antennas for both transmitting and receiving data streams. PO Resp. 7–9 (citing Ex. 2004 ¶¶ 34–35).

Petitioner’s Reply presents two main arguments: (i) that Patent Owner’s interpretation of “plurality of antennas” is overly narrow, and

(ii) that “critical aspects of Paulraj’s disclosure . . . demonstrate how all of the same plurality of antennas are used for both transmission and reception.” Pet. Reply 2 (citing Ex. 1051 ¶ 2). Regarding the interpretation of “plurality of antennas,” Petitioner contends “the ’083 patent itself does not preclude a scenario where the device is equipped with multiple antennas and configured to use a subset of those antennas depending on a communication mode (e.g., transmission/uplink or reception/downlink modes).” Pet. Reply 3 (citing Ex. 1051 ¶ 5. According to Petitioner, the ’083 patent states that its device includes multiple transmit/receive units and antennas for multiple simultaneous communication paths and “[e]ach antenna may be specifically designed for an assigned frequency or application or may be multiplexed for different uses.” Pet. Reply 3 (citing Ex. 1001, 6:26–28, 9:31–34, 4:3–5). “Depending on the ‘frequency or application’ currently used by the device,” Petitioner argues, “the device uses only *some* of those multiple antennas at a time.” Pet. Reply 3. Characterizing Patent Owner’s interpretation as requiring “that *all* of [the plurality of antennas] be used together *every time* the device is in data communication (either transmitting or receiving data),” Petitioner contends the Specification does not support that interpretation:

For instance, when the device has three antennas designed for different frequencies or applications (e.g., “Cellular 102, CB Radio 104, and Wireless 106” in an example of the ’083 patent) and is currently in operation using two of the radios at a particular time (e.g., cellular and wireless), the device will use only two of those antennas (e.g., cellular antenna and wireless antenna) at that time. The ’083 patent recognizes the benefits of operating the device in this way, instead of equipping the device with a set number of antennas to all be used at all times.

Pet. Reply 3–4 (citing Ex. 1001, 4:67–5:3; Ex. 1051 ¶ 5). Thus, according to Petitioner, the claims and the '083 patent Specification confirm that “transmitting/receiving signals ‘*using* the plurality of antennas’ does not require transmission/reception *via all* antennas.” Pet. Reply 5.

Although we do not understand the claims to require both transmission and reception “via all antennas” all of the time, we determine the claims require a set of antennas in which at least some of the antennas are for both transmitting and receiving. We disagree with Petitioner that two separate sets of antennas—one set of transmitting antennas and a separate, nonoverlapping set of receiving antennas—fall within the scope of the challenged claims.

First, neither the Petition nor Dr. Jensen presents intrinsic evidence to support Petitioner’s Reply position that nonoverlapping sets of antennas can satisfy the challenged claims. Instead, Petitioner contends “the '083 patent *does not exclude*” a device configured with a subset of antennas for transmission and a separate subset of antennas for reception (Pet. Reply 3; Ex. 1051 ¶ 5), but the weight of the evidence does not support Petitioner’s arguments. Petitioner and Dr. Jensen describe an example of the '083 patent as follows:

For instance, when the device has three antennas designed for different frequencies or applications (e.g., “Cellular 102, CB Radio 104, and Wireless 106” in an example of the '083 patent) and is currently operating using two of the radios at a particular time (e.g., cellular and wireless), the device will use only two of those antennas (e.g., cellular antenna and wireless antenna) at a time.

Pet. Reply 3–4; Ex. 1051 ¶ 5 (mirroring Pet. Reply). But contrary to Petitioner’s argument, that example in the '083 patent describes each of

cellular, CB radio, and wireless communication as using its own transmit/receive (“T/R”) units and antennas, not transmit antennas separate from receive antennas. Ex. 1001, 3:26–34, Fig. 1B. Indeed, neither Petitioner nor Dr. Jensen cites any clear evidence that the ’083 patent describes separate sets of dedicated transmit and receive antennas. In contrast, we agree with Dr. Cooklev and Patent Owner that the ’083 patent repeatedly and consistently describes using the same antennas for both transmitting and receiving data streams. Ex. 2004 ¶¶ 34–35 (describing Figures 4 and 9 of the ’083 patent and related portions of the Specification); PO Response 7–9 (same).

At oral argument, Petitioner acknowledged that the ’083 patent describes antennas that both transmit and receive (Tr. 6:11–13), while arguing that the ’083 patent is broad and unclear in its description of its antennas and that nothing in the Specification warrants importing limitations into the claims (Tr. 6:13–9:11). But we agree with Dr. Cooklev and Patent Owner that it is the plain meaning of the claims as read in the context of the Specification that defines the claims’ scope; this is not an instance of reading limitations from the Specification into the claims. Ex. 2004 ¶ 33; PO Resp. 5–6. The plain language of the claims defines a plurality of antennas and recites using “the” plurality of antennas to both transmit the first signal stream and receive the second signal stream. Although the claim language can be read in different ways, we do not agree with Petitioner’s reading that would define the plurality of antennas “as the set of both transmission and reception antennas” such that, with the plurality so defined, “that same plurality is used for transmission and reception.” Tr. 10:5–9. Even if the claim language and Specification do not necessarily foreclose a broad

reading, we determine the plain language of the claims read in the context of the Specification does not support such a broad reading.

The Court of Appeals for the Federal Circuit has explained that as a matter of claim construction, even under the rule of broadest reasonable interpretation, which is broader and more encompassing than the *Phillips* rule applicable here, the correct inquiry of claim scope “is not whether the specification proscribes or precludes some broad reading of the claim” and also “is not simply an interpretation that is not inconsistent with the specification.” *In re Smith International, Inc.*, 871 F.3d 1375, 1382, 1383 (Fed. Cir. 2017). The court further explained that the reason such claim interpretation rules are not followed is that under them,

[a]ny description short of an express definition or disclaimer in the specification would result in an adoption of the broadest *possible* interpretation of a claim term, irrespective of repeated and consistent descriptions in the specification that indicate otherwise. That is not properly giving the claim term its broadest reasonable interpretation in light of the specification.

Id. at 1383.

Here, Petitioner’s overly broad claim interpretation seems more tied to the teachings of Paulraj, as opposed to the ’083 patent’s claim language and Specification. The Petition cites Paulraj as disclosing separate transmit and receive units, each with a separate set of antennas: transmit unit 12 having transmit antennas 18A–18M and receive unit 14 having receive antennas 34A–34N. Pet. 20–28. Dr. Jensen, in his first deposition, confirmed that understanding. Ex. 2006, 29:6–11 (stating “Paulraj discloses separate antennas”); *see, e.g.*, Ex. 1003 ¶¶ 81, 87, 89 (“a POSITA would have understood or found obvious that Paulraj’s transmit unit includes, or operates as, one or more transmitters for transmitting signal streams via

respective transmit antennas, and that Paulraj's receive unit includes, or operates as, one or more receivers for receiving signal streams via respective receive antennas"), 90, 91, 92–94 (stating that Paulraj describes transmitting data streams using multiple transmit antennas TA), 95–96 (stating that Paulraj describes receiving data streams using multiple receive antennas RA).

Based on our understanding of the scope of the challenged claims as described above, we determine Petitioner has not shown that Paulraj's disclosure of separate sets of transmit antennas and receive antennas teach or suggest the "plurality of antennas" limitations of the challenged claims.

3. Petitioner's Reply Arguments Are Untimely and Unavailing

Petitioner argues for the first time in the Reply that Paulraj teaches the claimed "plurality of antennas" limitations even under Patent Owner's understanding of the claim scope. Pet. Reply 5–9. In the Reply, Petitioner argues:

a [person of ordinary skill in the art] would have readily understood and found obvious that Paulraj's "transmit antennas" and "receive antennas" were implemented as the same set of antennas, at least some of which were commonly used for both transmitting and receiving signals, thereby satisfying the "using the plurality of antennas" limitations in the claims, even under Patent Owner's narrow construction.

Pet. Reply 9 (citing Ex. 1051 ¶ 15).

We determine these arguments are not grounded in or supported by the Petition or within the scope of reasonable reply arguments. Nothing in the Petition maps any limitations of the challenged claims to alleged teachings in Paulraj of antennas that perform both transmission and reception. Thus, we agree with Patent Owner (Sur-Reply, 7) that this

argument in Petitioner's Reply would improperly recast Petitioner's reliance on Paulraj and is therefore untimely. Moreover, we agree with Dr. Cooklev (Ex. 2004 ¶ 37) that Paulraj is consistent in describing separate transmit units and receive units throughout its disclosure, and without an appropriate mapping of Paulraj's alleged teachings of transmit/receive antennas to the challenged claims in the Petition, Petitioner has not carried its burden to show unpatentability under such a theory, even if it were timely.

4. *Summary*

For the foregoing reasons, we determine Petitioner has not proven by a preponderance of the evidence that any of claims 1–9 or 12–20 is unpatentable in view of the combined teachings of Paulraj and Heath.

E. Conclusion

Based on the complete record, we determine Petitioner has not proven by a preponderance of the evidence that any of claims 1–9 or 12–20 of the '083 patent is unpatentable.

In summary:

Claims	35 U.S.C. §	References/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–9, 12–20	103	Paulraj, Heath		1–9, 12–20
Overall Outcome				1–9, 12–20

ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner has not proven by a preponderance of the evidence that any of claims 1–9 and 12–20 of the '083 patent is unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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