

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC., HTC CORPORATION,
HTC AMERICA, INC. and ZTE (USA) INC.,
Petitioner,

v.

INVT SPE LLC,
Patent Owner.

IPR2018-01476
Patent 7,764,711 B2

Before THU A. DANG, BARBARA A. BENOIT, and J. JOHN LEE,
Administrative Patent Judges.

LEE, *Administrative Patent Judge.*

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

INTRODUCTION

Apple Inc., HTC Corporation, HTC America, Inc., and ZTE (USA) Inc.¹ (collectively, “Petitioner”) filed a Petition (Paper 4, “Pet.”) requesting an *inter partes* review of claims 1–6 (“the challenged claims”) of U.S. Patent No. 7,764,711 B2 (Ex. 1001, “the ’711 Patent”). An *inter partes* review of all challenged claims was instituted on April 12, 2019. Paper 9 (“Inst. Dec.”). After institution, INVT SPE LLC (“Patent Owner”) filed a Patent Owner Response (Paper 11, “PO Resp.”), Petitioner filed a Reply (Paper 21, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 24, “PO Sur-reply”). An oral hearing was held on January 14, 2020. Paper 27 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). As explained below, Petitioner has shown by a preponderance of the evidence that all challenged claims of the ’711 Patent are unpatentable.

A. *Related Cases*

The parties identify as related to the present case the following district court cases: *INVT SPE LLC v. Apple Inc.*, Case No. 2:17-cv-03738 (D.N.J.); *INVT SPE LLC v. HTC Corporation*, Case No. 2:17-cv-03740 (D.N.J.); *INVT SPE LLC v. ZTE Corporation*, Case No. 2:17-cv-06522 (D.N.J.); *Inventergy, Inc. v. Apple Inc.*, Case No. 1:17-cv-00196 (D. Del.); and *Inventergy, Inc. v. HTC Corporation*, Case No. 1:17-cv-00200 (D. Del.). Pet. 67–68; Paper 5, 1. Patent Owner further identifies ten cases before the

¹ Petitioners identify ZTE Corporation as an additional real party-in-interest. Pet. 67.

Board involving petitions for *inter partes* review that it asserts may affect, or be affected by, the present case. Paper 5, 1–2.

B. The '711 Patent

The '711 Patent relates to “a transmission apparatus and transmission method which transmits signals from a plurality of transmission antennas like an MIMO (Multi-Input/Multi-Output) communication.” Ex. 1001, 1:10–14. The Specification describes two techniques for MIMO communications that each present challenges.

First, the Specification describes separating a data signal into “substreams” that are sent from “a plurality of transmission antennas at the same timing and same frequency . . . thereby transmit[ing] an amount of data proportional to the number of transmission antennas and realiz[ing] a high-speed, high-volume communication.” *Id.* at 1:42–47. This technique is known as spatial multiplexing. *See* Pet. 6 (citing Ex. 1003 ¶ 35); PO Resp. 2–3. This technique, however, suffers from the effects of interference, such as signal noise, which causes the error rate to deteriorate and results in poor channel quality. Ex. 1001, 1:48–59.

Second, to prevent such deterioration, the Specification describes a method whereby data is transmitted on one antenna and “the same data” (i.e., replica data) is sent on a plurality of antennas. *Id.* at 1:60–64. This technique is known as transmit diversity. *See* Pet. 5–6 (citing Ex. 1003 ¶ 33); PO Resp. 3. This technique, however, “reduces the transmission rate of the communication system,” which deteriorates transmission efficiency. Ex. 1001, 1:64–67.

The claimed invention is directed to solving both of these challenges, i.e., “to improve reception performance of specific data on a receiving side

while maintaining the transmission efficiency of a communication system.”
Id. at 2:3–6.

C. Challenged Claims

Petitioner challenges all of the claims of the '711 Patent. Claims 1 and 6 are the only independent claims. Claim 1 is illustrative and is reproduced below:

1. A transmitting apparatus employing a MIMO (multi-input/multi-output) scheme of transmitting a plurality of data items for a same receiving apparatus using a plurality of antennas in parallel, the transmitting apparatus comprising:

a mapping section that maps the plurality of data items to at least one of the plurality of antennas; and

a transmitting section that transmits the plurality of data items using the at least one of the plurality of antennas to the receiving apparatus,

wherein the mapping section generates a replica data item by replicating a specific data item of the plurality of data items, and maps the plurality of data items to the at least one of the plurality of antennas such that the specific data item and the replica data item are transmitted from different antennas at a same time.

D. Asserted Grounds of Unpatentability and Asserted Prior Art

Trial was instituted on the following grounds of unpatentability asserted in the Petition:

Claim(s) Challenged	35 U.S.C. §	References/Basis
1–6	103(a)	Paulraj, ² Huang, ³ Walton. ⁴
1–6	103(a)	Wallace, ⁵ Walton

Inst. Dec. 28; *see* Pet. 8–9. In addition, Petitioner relies on a declaration by its proffered expert witness, Dr. Andrew C. Singer (Ex. 1003). Likewise, Patent Owner relies on a declaration by its proffered expert witness, Dr. Branimir Vojcic (Ex. 2002).

ANALYSIS

A. Level of Ordinary Skill

Petitioner asserts that a person of ordinary skill in the art would have had a bachelor’s degree in electrical engineering or an equivalent as well as three years of experience working with “multi-antenna wireless communication systems,” or one year of such experience with a master’s degree in electrical engineering focusing on communications systems. Pet. 7–8 (citing Ex. 1003 ¶ 41). Patent Owner does not dispute Petitioner’s

² U.S. Patent No. 6,067,290, issued May 23, 2000 (Ex. 1005, “Paulraj”).

³ H. Huang et al., *Achieving High Data Rates in CDMA Systems Using BLAST Techniques*, in CONFERENCE RECORD, IEEE GLOBAL TELECOMMUNICATIONS CONFERENCE 2316 (1999) (Ex. 1006, “Huang”).

⁴ U.S. Patent No. 7,095,709 B2, issued Aug. 22, 2006 (Ex. 1008, “Walton”).

⁵ U.S. Patent Application Pub. No. 2002/0193146 A1, published Dec. 19, 2002 (Ex. 1009, “Wallace”).

formulation of the level of skill in the art, and applies it for its arguments. PO Resp. 10. Based on the information presented in the Petition and Dr. Singer’s testimony, we agree with Petitioner’s formulation, which is supported by the record and consistent with the prior art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

B. Claim Construction

In this case, we give claim terms their broadest reasonable construction in light of the Specification of the ’711 Patent. *See* 37 C.F.R. § 42.100(b) (2018)⁶; *see Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016). The parties propose constructions for multiple claim terms (Pet. 10–12; PO Resp. 10–11), but we only construe claims to the extent necessary to resolve the issues in controversy. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

First, we preliminarily construed the term “specific data” in the Decision on Institution as “data given a higher priority in transmission.” Inst. Dec. 8. Neither party disputed this preliminary construction, and both parties adopted it during trial. *See* PO Resp. 10–11; Pet. Reply 7–8. We do not discern any evidence in the full record after trial indicating that this construction is incorrect or should be modified. Thus, we apply this construction in this Decision for the same reasons explained in the Decision on Institution. Inst. Dec. 6–8.

⁶ This rule has since been amended, but the amendment does not apply here because the Petition was filed before its effective date of November 13, 2018. *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018).

During trial, however, the parties disagreed about whether the challenged claims should be construed to require that both spatial multiplexing and transmit diversity be applied *simultaneously*. PO Resp. 7–9; Pet. Reply 1–6; PO Sur-reply 2–8. As explained below, we determine that the claims require this simultaneity.⁷ But before addressing the merits of the parties’ positions, we first address both parties’ assertions of waiver.

1. Alleged Waiver by Petitioner

According to Patent Owner, Petitioner waived any argument that simultaneity is not required because “Petitioners expressly represented that the inventions claimed in the ’711 Patent require ‘simultaneous’ transmit diversity and spatial multiplexing.” PO Sur-reply 2–3. Patent Owner identifies two purportedly “unambiguous assertions” to that effect in the Petition. *Id.*

First, the Petition states that “the lower priority data items are transmitted according to spatial multiplexing while the high priority ‘specific data’ is *simultaneously* transmitted from multiple antennas according to transmit diversity techniques.” Pet. 4 (emphasis added). This portion of the Petition, however, is discussing a specific embodiment in the Specification of the ’711 Patent (Figure 4) as part of a background description of the patent—far from an “unambiguous” statement regarding the construction of a specific claim or claim language.

⁷ For ease of reference, we use the term “simultaneity” in this Decision to refer to the interpretation of the claims requiring that both spatial multiplexing and transmit diversity be applied simultaneously.

Second, the Petition states that “[t]he ’711 Patent specification characterizes the alleged invention as the *simultaneous* implementation of spatial multiplexing . . . and transmit diversity.” Pet. 44 (emphasis added). This statement, however, introduces Petitioner’s second asserted ground of unpatentability, based on Wallace and Walton, which Petitioner explicitly states would only apply “[t]o the extent the Challenged Claims are interpreted so broadly as to encompass *switching* between transmit diversity and spatial multiplexing modes.” *Id.* at 44–45 (emphasis added). In other words, Petitioner acknowledges both claim interpretations and presents the second ground to address one of them, i.e., no simultaneity.

Thus, we determine that the Petition is most reasonably understood to be presenting arguments pertaining to *both* interpretations of the claims, i.e., with *and without* simultaneity. In other words, Petitioner’s position is that the challenged claims are unpatentable under either construction, which is explained sufficiently in the Petition. *See id.* As such, we are unpersuaded that Petitioner waived its argument that simultaneity is not required. Moreover, we also note that Patent Owner clearly discerned that Petitioner’s arguments implicated the issue of whether simultaneity is required by the challenged claims, and had a full and fair opportunity to address Petitioner’s positions. *See* PO Resp. 7–9, 25–27, 43–46; PO Sur-reply 2–10, 24.

2. *Alleged Waiver by Patent Owner*

As discussed in more detail below, Patent Owner’s argument that the claims require simultaneity depends on an argument that the preambles of claims 1 and 6 are limiting. Petitioner argues that Patent Owner waived any argument that the preambles are limiting because “[Patent Owner] has not proposed a construction for the preamble nor has [Patent Owner] contended

the preamble is limiting,” citing the section titled, “Claim Construction,” in the Patent Owner Response. Pet. Reply 5 (citing PO Resp. 10–11).

Petitioner, however, ignores the section in the Patent Owner Response titled, “Simultaneous Implementation of Spatial Multiplexing and Transmit Diversity,” in which Patent Owner argues simultaneity is required by the challenged claims. See PO Resp. 7–9. This argument includes an assertion that spatial multiplexing is required by the claim language “using a plurality of antennas in parallel,” which is recited in the preambles of claims 1 and 6. See *id.* Thus, we are not persuaded Patent Owner waived its argument that the preambles are limiting. In addition, we note that Petitioner clearly discerned that Patent Owner’s arguments implicated the issue of whether the preambles are limiting, and had a full and fair opportunity to address Patent Owner’s positions. See Pet. Reply 5–6.

3. *Whether the Claims Require Simultaneity*

Having determined that neither party waived arguments relevant to the simultaneity issue, we now turn to whether the challenged claims should be construed to require simultaneity. For the reasons explained below, we conclude that they should.

We begin with the language of the claims. See *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999) (“The starting point for any claim construction must be the claims themselves.”). Given that both independent claims are essentially identical in relevant part, we focus on the language of claim 1 for simplicity.⁸ First, the preamble of

⁸ Neither party advanced any argument that any of the challenged claims should be interpreted differently with respect to simultaneity.

claim 1 recites, “transmitting a plurality of data items . . . using a plurality of antennas in parallel.” The parties agree that the preamble recites spatial multiplexing. *See* PO Sur-reply 4; Tr. 6:13–26 (Petitioner indicating “we agree that the claims require transmit diversity and signal multiplexing,” and that “the spatial multiplexing . . . seems to be centered in the preamble”). We agree as well. As discussed above, the Specification describes the transmission of a data stream that is split into “substreams,” which are transmitted using “a plurality of transmission antennas at the same timing and same frequency.” Ex. 1001, 1:42–47. Both parties agree this describes spatial multiplexing. *See* Pet. 6 (citing Ex. 1003 ¶ 35); PO Resp. 2–3. The language of the preamble matches the above description: “transmitting a plurality of data items . . . using a plurality of antennas in parallel.”

The parties do not agree, however, on whether the preamble is limiting. *See* Pet. Reply 5; PO Sur-reply 7–8; Tr. 8:5–15. “In general, a preamble limits the invention if it recites essential structure or steps, or if it is ‘necessary to give life, meaning, and vitality’ to the claim.” *Catalina Mktg. Int’l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) (quoting *Pitney Bowes*, 182 F.3d at 1305). On the other hand, a preamble generally is not limiting “where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention.” *Id.* (quoting *Rowe v. Dror*, 112 F.3d 473, 478 (Fed. Cir. 1997)). For example, if “deletion of the preamble phrase does not affect the structure or steps of the claimed invention,” the preamble is not limiting. *Id.* at 809 (citing *IMS Tech., Inc. v. Haas Automation, Inc.*, 206 F.3d 1422, 1434 (Fed. Cir. 2000)).

Here, we are persuaded the preamble is limiting. Although the parties dispute whether spatial multiplexing and transmit diversity occur simultaneously, it is undisputed that spatial multiplexing is part of the claimed invention. *See* Pet. 2; PO Resp. 6; Tr. 6:13–26 (Petitioner indicating “we agree that the claims require transmit diversity and signal multiplexing”). The Specification supports this view. For example, the Specification states that “i[t] is an object of the present invention to improve reception performance of specific data on a receiving side *while maintaining the transmission efficiency* of a communication system.” Ex. 1001, 2:3–6 (emphasis added). The technique for improving transmission efficiency disclosed in the Specification is spatial multiplexing. *See id.* at 5:13–17 (describing “two transmission systems to transmit different items of data, [which] maintains high transmission efficiency”), Figs. 3, 4; *see also id.* at 1:42–47 (indicating “signals sent from a plurality of transmission antennas at the same timing and same frequency in substream units” help “realize a high-speed, high-volume communication”).

Further, the *only* part of claim 1 that recites spatial multiplexing is the preamble. *See* Pet. Reply 3–6; PO Sur-reply 4; Ex. 1020, 21:22–22:18. Neither party indicates that any other claim language captures spatial multiplexing. Thus, if the preamble is not limiting, claim 1 would not incorporate spatial multiplexing at all, which is inconsistent with how the invention is described in the Specification. Consequently, we determine that the preamble of claim 1 recites “essential structure or steps” and, thus, is “necessary to give life, meaning, and vitality” to the claim. *See Catalina Mktg.*, 289 F.3d at 808.

We also note that despite contending that the preamble is not limiting, Petitioner does not present any timely arguments,⁹ or identify evidence, affirmatively explaining why such a conclusion would be correct. *See* Pet. Reply 5 (arguing waiver only). Petitioner’s expert, Dr. Singer, did not address whether the preamble is limiting in his Declaration submitted with the Petition, and Petitioner did not submit any further testimony from Dr. Singer. Patent Owner’s expert, Dr. Vojcic, testified that “[t]he challenged claims take advantage of spatial multiplexing by ‘using a plurality of antennas in parallel.’” Ex. 2002 ¶ 33 (quoting the language of the preamble). Thus, both the intrinsic evidence and the available expert testimony supports Patent Owner’s contention that the preamble is limiting.

For all of the above reasons, we conclude that the preamble of claim 1 is limiting. For similar reasons, the nearly-identical preamble of claim 6 is limiting as well. This does not fully resolve the issue of whether simultaneity is required, however. As we now explain, the claim as a whole—including the preamble—requires simultaneity.

As discussed above, the preamble recites “transmitting a plurality of data items . . . using a plurality of antennas in parallel,” which recites spatial multiplexing. Critically, this requires that the *entire* plurality of data

⁹ Although Petitioner’s counsel addressed whether the preamble is limiting at the oral hearing, arguments raised for the first time at the hearing are untimely and were not considered. *See* Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,768 (Aug. 14, 2012); *see also* Patent Trial and Appeal Board Consolidated Trial Practice Guide, 85–86, *available at* <https://www.uspto.gov/trialpracticeguideconsolidated> (consolidating the Office Patent Trial Practice Guide with subsequent updates); 84 Fed. Reg. 64,280 (Nov. 21, 2019).

items—i.e., all of the data items—is transmitted “using a plurality of antennas in parallel.”

The final limitation of claim 1 (the “wherein” clause) recites “generat[ing] a replica data item by replicating a specific data item of the plurality of data items, and map[ping] the plurality of data items to the at least one of the plurality of antennas such that the specific data item and the replica data item are transmitted from different antennas at a same time.” It is undisputed that this limitation recites transmit diversity. Critically, as Patent Owner observes, this limitation recites “a specific data item *of the plurality of data items*” (emphasis added), i.e., the “specific data item” that is replicated for transmit diversity is part of the same “plurality of data items” recited in the preamble for spatial multiplexing. *See* PO Resp. 7 (“Therefore, the specific data item described in transmit diversity (TD) with the replica data item, is also involved in spatial multiplexing (SM) at the same time . . . with other data items of the plurality [of] data items”); PO Sur-reply 4 (asserting that the “same ‘plurality of data items’ are subject to spatial multiplexing in the preamble and transmit diversity in [the ‘wherein’ clause]”); Tr. 44:22–45:2.

Consequently, in order for both the preamble limitations *and* the “wherein” clause limitations to be met, a plurality of data items, *including the specific data item*, must be transmitted via spatial multiplexing, i.e., using a plurality of antennas in parallel. In other words, *both* the specific data item *and* at least one other data item that is *different* (i.e., the recited “plurality”) must be transmitted at the same time. In addition, *both* the specific data item *and* its replica data item must *also* be transmitted at the same time, as recited in the “wherein” clause, for transmit diversity. Thus,

at least *three* data items—the specific data item, its replica, and another different data item—must be transmitted at the same time to satisfy the claim because both spatial multiplexing (preamble) and transmit diversity (“wherein” clause) must occur. *See* PO Resp. 7; Pet. Reply 2–3; Ex. 1020, 12:17–21. As a result, the claim requires simultaneity.

Petitioner’s arguments opposing this interpretation are unpersuasive. First, Petitioner argues that Patent Owner relies on the “wherein” clause to support a simultaneity requirement, but the “wherein” clause does not require spatial multiplexing. Pet. Reply 3–4. As discussed above, however, Patent Owner relies on both the “wherein” clause *and* the preamble, and it did not waive its arguments regarding the preamble. Also as discussed above, it is the preamble that requires spatial multiplexing, not the “wherein” clause. Thus, Petitioner’s argument is misplaced.

Next, Petitioner asserts that Dr. Vojcic “concede[d] that no limitation recites” a simultaneity requirement. *Id.* at 4–5. This argument is misleading. The cited testimony from Dr. Vojcic’s deposition addressed each of the limitations of claim 1 *except the preamble*. *See* Ex. 1020, 6:6–10:4. In fact, Dr. Vojcic testified in his Declaration that the challenged claims require “simultaneous combination of [spatial multiplexing] and [transmit diversity]” based on the claim language of the preamble and the “wherein” clause together. *See* Ex. 2002 ¶ 33.

Finally, Petitioner contends that “the preamble here should not be read to require [simultaneity] under the broadest reasonable interpretation,” because Patent Owner purportedly agreed to a claim construction of the preamble in a co-pending proceeding at the U.S. International Trade Commission (ITC) that does not mention transmit diversity. Pet. Reply 5–6

(citing Ex. 2001, 5). This argument, however, addresses only the preamble, and does not address Patent Owner’s contention that the preamble *and* the “wherein” clause, when considered together, indicate that simultaneity is required by claim 1.¹⁰

* * *

In sum, we construe “specific data” as “data given a higher priority in transmission.” We also construe claims 1 and 6 as requiring simultaneity, i.e., that the recited “specific data item” is transmitted at the same time as both its replica data item (transmit diversity) and at least one other, different data item (spatial multiplexing). No other claim terms require express construction. *See Nidec Motor Corp.*, 868 F.3d at 1017.

C. Alleged Unpatentability Under § 103(a)

A claim is unpatentable under § 103 if the differences between the claimed subject matter 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). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in

¹⁰ The joint claim construction proposal for the preamble at the ITC was, “multiple-antenna apparatus, which transmits multiple data items (transmission data) at the same time and at the same frequency using multiple antennas.” Ex. 2001, 5. We note that this construction is consistent with spatial multiplexing and our discussion of the preamble above.

the art; and (4) objective evidence of nonobviousness, i.e., secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

Additionally, the obviousness inquiry typically requires an analysis of “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (requiring “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”)); see *In re Warsaw Orthopedic, Inc.*, 832 F.3d 1327, 1333 (Fed. Cir. 2016) (citing *DyStar Textilfarben GmbH & Co. Deutschland KG v. C. H. Patrick Co.*, 464 F.3d 1356, 1360 (Fed. Cir. 2006)).

1. *Overview of the Asserted Prior Art*

a. *Paulraj (Ex. 1005)*

Paulraj is a U.S. patent issued on May 23, 2000, and relates to “implementing spatial multiplexing in conjunction with the one or more multiple access protocols during the broadcast of information in a wireless network.” Ex. 1005, 1:53–56. Spatial multiplexing is “a transmission technology which exploits multiple antennas at both the base station(s) and at the subscriber units to increase the bit rate in a wireless radio link.” *Id.* at 5:38–42. A data stream is split into multiple independent substreams, transmitted on multiple antennas, and reconstituted after reception. *Id.* at 5:42–67. In addition, aside from the antennas used for the spatial multiplexing scheme, “[a]dditional antennas on the transmit or receive side are then used for diversity purposes and further improve the link reliability by improving, for example, the signal-to-noise ratio or allowing for smaller fading margins, etc.” *Id.* at 6:7–13.

b. Huang (Ex. 1006)

Huang is an article titled, “Achieving High Data Rates in CDMA Systems Using BLAST Techniques,” appearing in the Conference Record for the IEEE Global Telecommunications Conference held in Rio de Janeiro, Brazil, in December 1999. Ex. 1006, 6, 38.¹¹ According to Huang, “[h]igh speed data transmissions are achieved by demultiplexing a single data stream into G substreams, each with rate R,” and transmitting the substreams “over one or more antennas (more antennas to achieve transmit diversity).” *Id.* at 38. The same substream may be “simultaneously transmitted from more than one antenna.” *Id.*

c. Walton (Ex. 1008)

Walton is a U.S. patent filed on June 24, 2002, and issued on August 22, 2006. Ex. 1008, code (22), (45). Walton relates to “[t]echniques . . . for transmitting data in a manner to improve the reliability of data transmission.” *Id.* at 2:24–25. “These transmission modes may include diversity transmission modes, which may be used to achieve higher reliability for certain data transmission (e.g., for overhead channels, poor channel conditions, and so on).” *Id.* at 2:27–31.

d. Wallace (Ex. 1009)

Wallace is a U.S. patent application published on December 19, 2002, that relates to a “method for communication in a wireless communication system,” and specifically configuring transmission based on “antenna diversity status information.” Ex. 1009 ¶¶ 7–8. MIMO systems with

¹¹ We use the exhibit pagination added by Petitioners in Exhibit 1006.

multiple transmit antennas and multiple receive antennas are described. *See, e.g., id.* ¶ 88. Wallace discloses a “diversity communication mode” that “employs diversity to improve the reliability of the communication link.” *Id.* ¶ 79. According to Wallace, “the two basic types of MIMO links are: pure diversity, i.e., both transmit and receive diversity; and spatial multiplexing, i.e., parallel channels.” *Id.* ¶ 106.

2. *Alleged Obviousness Over Paulraj, Huang, and Walton*
a. *Independent Claims 1 and 6*

Petitioner contends both independent claims of the ’711 Patent are obvious in view of the combined teachings of Paulraj, Huang, and Walton. Pet. 18–37, 43–44. Claims 1 (apparatus) and 6 (method) recite nearly identical limitations, and both parties rely on the same arguments for both claims. *See* Pet. 43–44; PO Resp. 24–43.

According to Petitioner, Paulraj teaches both a transmitting apparatus (claim 1) and a transmitting method (claim 6) employing a MIMO scheme in which a plurality of data items are transmitted on a plurality of antennas in parallel. Pet. 18–21, 43. Paulraj describes “[s]patial multiplexing” as “a transmission technology which exploits multiple antennas at both the base station(s) and at the subscriber units.” Ex. 1005, 5:38–42; *see also id.* at Fig. 3 (depicting a base station (“BTS”) with final stage transmitter 316 coupled to antennas 134T and 136T). As disclosed in Paulraj, a data stream is split into multiple “independent substreams” that are “applied separately to the N transmit antennas and launched into the radio channel.” *Id.* at 5:44–55. An “array of receive antennas” receives the transmission, and the signals are processed to “recover the original substreams and finally merge the symbols back together.” *Id.* at 5:58–67. Patent Owner does not dispute

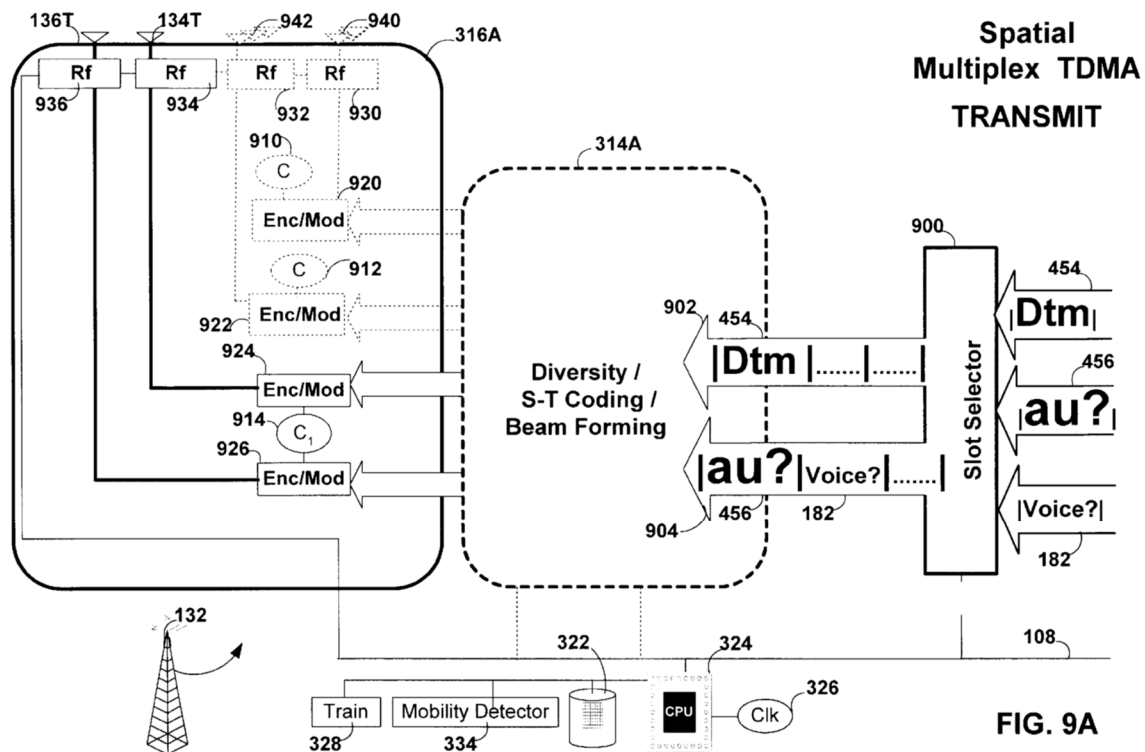
that Paulraj teaches the elements recited in the preambles of claims 1 and 6. *See* PO Resp. 25 (acknowledging that Paulraj teaches spatial multiplexing).

With respect to the “mapping section” (claim 1) and “mapping step” (claim 6) that “maps the plurality of data items to at least one of the plurality of antennas,” Petitioner relies on Paulraj’s disclosure of “spatial multiplexing and multiple access processes/logic” (“SM_MA processes/logic”), which may be implemented in a control module. Pet. 21–22, 43 (quoting Ex. 1005, 7:26–28, 14:58–63, Fig. 3). For example, Paulraj discloses SM_MA processes/logic 104, which “parse[s] and route[s] subscriber data stream 170 into substreams 172–174, which are transmitted . . . over the spatially separate antenna 134–136 of BTS 132.” Ex. 1005, 8:6–11. SM_MA processes/logic 104 can “provide to each antenna 134–136 of BTS 132 a single substream derived from the original datastream 170.” *Id.* at 10:33–39. Patent Owner does not dispute that Paulraj teaches these limitations of claims 1 and 6.

Petitioner contends Paulraj teaches the “transmitting section” (claim 1) and “transmitting step” (claim 6), which “transmits the plurality of data items using the at least one of the plurality of antennas to the receiving apparatus,” in its disclosure of final stage transmitter 316. Pet. 26–28, 44. Paulraj discloses that transmitter 316 is “coupled to a spatially separate antenna array which includes antennas 134T–136T.” Ex. 1005, 12:49–51. When the “datastream(s)/substreams are then passed to the final transmit stage 316,” traffic is routed to the appropriate antenna (134T–136T) for transmission. *Id.* at 13:1–9. Antennas 140R–142R on the receive side “detect downlink composite signals derived from the spatially separate transmission of the substreams through antennas 134T–136T.” *Id.* at 13:20–

23. Figure 3 of Paulraj depicts these components of both the BTS and the subscriber unit on the receive side. *Id.* at Fig. 3. Patent Owner does not dispute that Paulraj teaches these limitations.

For the limitations of generating “a replica data item” by “replicating a specific data item of the plurality of data items” and mapping the plurality of data items to antennas “such that the specific data item and the replica data item are transmitted from different antennas at a same time,” Petitioner identifies disclosures in Paulraj, Walton, and Huang as allegedly teaching the limitations. Pet. 28–37, 44. Paulraj indicates that “[a] *single* substream . . . may be transmitted from *more than one antenna*, if *diversity* or beam forming transmit processes are implemented in addition to spatial multiplexing.” Ex. 1005, 19:46–49 (emphases added). Petitioner identifies Figure 9A, reproduced below, as particularly relevant.



Id. at Fig. 9A. Figure 9A depicts components of a BTS, including slot selector 900, transmit processor module 314A, and final transmit stage 316A. *Id.* at 26:10–13.

As shown in Figure 9A, substreams 454 and 456 derived from a subscriber datastream are inputs to slot selector 900. *Id.* at 26:22–25. Substreams 454 and 456 are assigned by slot selector 900 to identical time slots in TDMA (time-division multiple access) datastreams 902 and 904, which are inputs to transmit processor module 314A. *Id.* at 26:29–34, 26:37–39. Transmit processor module 314A implements “well known prior art techniques for improving signal quality,” including “diversity processing.” *Id.* at 26:39–46. The outputs are provided to final transmit stage 316A, including encoder modulators 924 and 926 leading to antennas 134T and 136T, respectively, which conduct the “spatially separate transmission” of substreams 454 and 456. *Id.* at 26:50–57, Fig. 9A. Final transmit stage 316A also includes additional antenna arrays 940 and 942 and associated encoder modulators 920 and 922, which are used to implement transmit processes such as diversity processing. *Id.* at 26:58–60. As Petitioner notes (Pet. 30), transmit processor module 314A receives *two* input substreams (454 and 456) and produces *four* outputs, consistent with its performance of diversity processing. *See* Ex. 1005, Fig. 9A. Two of these four outputs are transmitted on antennas 940 and 942, which are used to implement diversity processing. *Id.* at 26:58–60, Fig. 9A.

Petitioner further cites Walton’s disclosure that “[e]ach diversity transmission mode *redundantly* transmits data over time, frequency, space, or a combination thereof.” Ex. 1008, code (57) (emphasis added); Pet. 31. Walton also describes a “diversity processor” that feeds data symbols into a

“symbol repetition unit” that “repeats each modulation symbol based on the (e.g., dual or quad) diversity to be provided” for each symbol. *Id.* at 10:61–65. According to Petitioner, a person of ordinary skill would have combined the teachings of Paulraj and Walton such that the Paulraj system would apply the specific teachings of transmitting replica data for transmit diversity in Walton to conduct the diversity processing disclosed in Paulraj. *See* Pet. 32–33 (citing Ex. 1003 ¶¶ 60–62).

With respect to the recited “specific data” that is replicated—i.e., data given a higher priority in transmission, as construed above—Petitioner relies on Walton’s disclosure that “diversity transmission modes may be used for overhead channels on the downlink, such as broadcast, paging, and other common channels.” Ex. 1008, 10:5–8; Pet. Reply 7–8. Walton also indicates diversity transmission may be used, for example, when channel conditions are poor. Ex. 1008, 10:8–15; Pet. Reply 7–8. As Petitioner notes (Pet. Reply 7), the ’711 Patent indicates “specific data” includes, for example, “data to be transmitted now to the receiving side having poor channel quality.” Ex. 1001, 3:60–66.

Additionally, Petitioner relies on Huang’s disclosure of a transmit diversity scheme in which “the same substream is *simultaneously* transmitted from more than one antenna” (Ex. 1006, 38 (emphasis added)) as teaching the limitation of claims 1 and 6 that the specific data item and replica data item are transmitted from different antennas “at a same time.” Pet. 35–36. Based on Dr. Singer’s testimony, Petitioner asserts that transmitting a substream and its replica using multiple different antennas at the same time, as taught in Huang, was a well-known transmit diversity technique. *Id.* at 36–37 (citing Ex. 1003 ¶ 69).

Finally, Petitioner contends that the combination of Paulraj, Walton, and Huang also teaches simultaneity. *See* Pet. 34–37; Pet. Reply 12–13. For example, Petitioner relies on Figure 9A of Paulraj, which depicts substreams 454 and 456 routed to antennas 134T and 136T for spatial multiplexing. *See* Pet. 34–35; Pet. Reply 12–13; Ex. 1005, Fig. 9A. According to Petitioner, in light of the teachings of Walton and Huang regarding the details of transmit diversity (i.e., symbol replication and simultaneous transmission), the two additional outputs from transmit processor module 314A routed to antennas 940 and 942 in Figure 9A of Paulraj teach replica data items that are transmitted at the same time as the substreams routed to antennas 134T and 136T. *See* Pet. 34–37; Pet. Reply 12–13; Ex. 1005, Fig. 9A. In other words, all four data items, two of which are different substreams (spatial multiplexing) and two of which are replicas (transmit diversity), would be transmitted at the same time across four antennas in parallel, consistent with simultaneity. Patent Owner’s expert, Dr. Vojcic, confirmed that a person of ordinary skill would have had this understanding of how transmit diversity would be implemented in the system depicted in Paulraj’s Figure 9A. Ex. 1020, 26:4–11, 27:18–28:4.

Based on the complete trial record, we agree with Petitioner’s reasoning and evidence discussed above. Consequently, we find that a preponderance of the evidence indicates that the combination of Paulraj, Walton, and Huang teaches each limitation of claims 1 and 6, including the requirement of simultaneity. Patent Owner advances several arguments opposing Petitioner’s contentions, which we find unpersuasive for the reasons explained below.

First, Patent Owner argues that Paulraj does not disclose simultaneity because “[t]he portions of Paulraj cited by Petitioners . . . describe only that a single data stream may be transmitted by more than one antenna, e.g., by using diversity or beam forming.” PO Resp. 27. Patent Owner faults Petitioner for purportedly failing to explain *how* Paulraj teaches simultaneity, and asserts that “[m]erely showing that transmit diversity may be implemented in a multiple antenna configuration, does not imply that spatial multiplexing and transmit diversity are implemented simultaneously.” *Id.* This argument is conclusory, however, and fails to address the specifics of Petitioner’s contentions. As discussed above, Petitioner explained how the combined teachings of the asserted art would lead a skilled artisan to transmitting both different substreams *and* replica data at the same time, e.g., the four data items depicted in Figure 9A of Paulraj when viewed in light of Walton’s and Huang’s teachings about transmit diversity. *See* Pet. 34–37; Pet. Reply 12–13; Ex. 1005, Fig. 9A; Ex. 1020, 26:4–11, 27:18–28:4. Additionally, Patent Owner addresses Paulraj individually, rather than properly addressing the asserted combination of references. *See Bradium Techs. LLC v. Iancu*, 923 F.3d 1032, 1050 (Fed. Cir. 2019) (“A finding of obviousness, however, cannot be overcome by attacking references individually where the rejection is based upon the teachings of a combination of references.” (internal quotations omitted)); *In re Keller*, 642 F.2d 413, 426 (CCPA 1981).

Next, Patent Owner argues that Paulraj fails to teach a “specific data item,” as properly construed, because neither substream depicted in Figure 9A is disclosed as being data given a higher priority in transmission. PO Resp. 27–30. This is because “substreams 454 and 456 are different

portions of one datastream 176,” and “Paulraj does not disclose how the single datastream 176 can be properly processed for transmit diversity . . . when the inputs are different data items derived from the same datastream.” *Id.* at 29. Moreover, Patent Owner contends that neither substream teaches the recited “specific data item” because the substreams “necessarily have the same priority because they represent alternate symbols of a data item, datastream 176.” *Id.*

Again, however, Patent Owner addresses Paulraj individually, rather than properly addressing the asserted combination of references. *See Bradium Techs.*, 923 F.3d at 1050. As discussed above, Petitioner relies on the combination of Paulraj with Walton and Huang, and particularly Walton’s teaching of using transmit diversity for data items with higher priority, e.g., data sent when channel conditions are poor. Moreover, Patent Owner also does not address all of Paulraj’s disclosures identified by Petitioners, notably its disclosure that “[a] *single* substream . . . may be transmitted from *more than one antenna*, if *diversity* or beam forming transmit processes are implemented in addition to spatial multiplexing.” Ex. 1005, 19:46–49 (emphases added).

Relatedly, Patent Owner also argues that Figure 9A of Paulraj, in fact, teaches only *one* data item because substreams 454 and 456 are really part of datastream 176, purportedly the only “data item” in the figure. *See* PO Sur-reply 10. This argument similarly fails, however, because it only addresses Paulraj individually (and, indeed, only one disclosure of Paulraj). *See Bradium Techs.*, 923 F.3d at 1050. As discussed above, Petitioner relies on teachings from Walton and Huang regarding the transmission of a data item and a replica data item. Further, Patent Owner itself describes Paulraj as

disclosing spatial multiplexing (PO Resp. 12–13), and explains that spatial multiplexing involves transmitting “different data items in parallel” (*id.* at 3). Still further, the ’711 Patent itself describes “signals sent from a plurality of transmission antennas at the same timing and frequency *in substream units.*” Ex. 1001, 1:42–47 (emphasis added). Thus, we are not persuaded that a skilled artisan would have understood Paulraj’s teachings to be limited to “one single data item,” or Figure 9A specifically to be limited to only one “data item.” *See* PO Sur-reply 9–10.

Rather than address the combination of art asserted by Petitioner, Patent Owner next addresses Walton individually. PO Resp. 30–32. Patent Owner contends that Walton “neither expressly nor inherently discloses selecting a *specific* data item having a higher priority in transmission.” *Id.* at 30. This contention is conclusory, however, and is refuted by the disclosures in Walton discussing the use of diversity transmission “to achieve higher reliability for certain data transmissions,” such as “for overhead channels on the downlink, such as broadcast, paging, and other common channels,” as well as “when the channel conditions are sufficiently poor.” Ex. 1008, 10:4–15; *see* Pet. 38; Pet. Reply 8. The ’711 Patent itself indicates “specific data” includes, for example, “data to be transmitted now to the receiving side having poor channel quality.” Ex. 1001, 3:60–66. Thus, Patent Owner is simply incorrect in asserting that “Walton contains no disclosure of data items having a higher priority in transmission than other data items.” PO Resp. 31.

Patent Owner also alleges that the “symbol repetition unit” described in Walton replicates *all* symbols, i.e., “not just those with higher priority in transmission” (i.e., a “specific data item”). *Id.* The cited disclosure in

Walton, however, merely describes that the symbol repetition unit replicates “each modulation symbol based on the (e.g., dual or quad) diversity to be provided for the modulation symbol.” Ex. 1008, 10:61–65. It does not, however, indicate that *all data* is sent indiscriminately to the symbol repetition unit for replication, just that any data sent to the unit would be fully replicated. *See id.*

We also are unpersuaded by Patent Owner’s assertion that Petitioner failed to explain “why a [person of ordinary skill] would understand Walton as relevant to enabling transmit diversity to improve link reliability in parallel with spatial multiplexing transmissions.” PO Resp. 31–32. As already discussed, Walton discloses using transmit diversity to boost reliability for certain transmissions or under certain conditions. *See* Ex. 1008, 10:4–15. Although Patent Owner is correct that Walton does not discuss combining transmit diversity with spatial multiplexing, Petitioner relies on the combination of Walton with Paulraj and Huang as teaching simultaneity, not Walton alone. *See* Pet. 34–37; Pet. Reply 12–13. Again, Patent Owner erroneously attacks a single reference in the combination individually. *See Bradium Techs.*, 923 F.3d at 1050.

Patent Owner does the same with Huang. According to Patent Owner, “Huang does not disclose transmitting spatial multiplexing and transmit diversity simultaneously” (i.e., simultaneity) and, in particular, “substreams in Huang are derived from a single datastream, i.e., data item, [so] they all necessarily have [the] same importance/priority.” PO Resp. 34–35. Therefore, Patent Owner argues, “Huang does not teach transmission of, nor allows for, transmission of a specific data item, with its replica at the same time, and simultaneously with other data items from other antennas.” *Id.*

at 35. As explained above, however, Petitioner relies on the combination of Paulraj, Walton, and Huang as teaching simultaneity, not Huang alone. Regarding the recited “specific data item,” Petitioner specifically relies on the combination with the teachings of Walton regarding engaging transmit diversity for certain data items with a higher priority in transmission, as discussed above. Thus, we are not persuaded by Patent Owner’s arguments focusing on Huang individually. *See Bradium Techs.*, 923 F.3d at 1050.

Additionally, Patent Owner contends that Huang does not teach transmitting a data item and its replica from different antennas at the same time. PO Resp. 33–34 (citing Ex. 2002 ¶ 43). Petitioner does rely on Huang for this teaching. *See* Pet. 35–36. Patent Owner, however, does not address the disclosures of Huang that Petitioner relies on, instead asserting that four particular code-spreading configurations disclosed in Huang fail to disclose transmission of a data item and its replica at the same time. *See* PO Resp. 33–34 (citing Ex. 1006, Figs. 1A–1D). Even assuming Patent Owner is correct about those particular configurations, Huang undisputably discloses a configuration where “the same substream is simultaneously transmitted from more than one antenna.” Ex. 1006, 38. Dr. Singer testified that this disclosure would have taught an ordinary artisan to transmit a substream and its replica on different antennas at the same time, consistent with claims 1 and 6. Ex. 1003 ¶¶ 67–68. We find this testimony credible and supported by the cited evidence. Although Patent Owner cites Dr. Vojcic’s testimony to support its argument, Dr. Vojcic also does not address the disclosures of Huang that were identified by Petitioner and Dr. Singer. *See* Ex. 2002 ¶ 43. Thus, we give his testimony less weight than that of Dr. Singer on this issue.

For the reasons explained above, we are persuaded that the combination of Paulraj, Walton, and Huang would have taught each limitation of claims 1 and 6 to a person of ordinary skill in the art. To prove obviousness, however, Petitioner must also demonstrate that “there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418. As explained below, we determine that Petitioner has established such a reason to combine by a preponderance of the evidence.

According to Petitioners, a person of ordinary skill would have been motivated to combine the teachings of Paulraj, Walton, and Huang in the manner set forth in the Petition for several reasons. Pet. 32–34, 36–37, 39–40. Petitioners contend that Paulraj and Walton both similarly teach transmit processors that implement transmit diversity schemes. *Id.* at 32. Petitioners note that Paulraj does not expressly disclose some details of implementing transmit diversity, but assert such details (and transmit diversity techniques generally) were well-known in the art as evidenced by Walton, which discloses such implementation details. *See id.* at 32–33 (citing Ex. 1003 ¶¶ 60–61). Based on Dr. Singer’s testimony, Petitioners assert an ordinary artisan would have understood that combining the specific transmit processor and diversity functions disclosed in Walton with the transmit processor in Paulraj would have constituted applying known methods to achieve predictable results—i.e., a transmit processor performing Walton’s transmit diversity schemes within the system of Paulraj, which would confer “the disclosed benefit of improved link reliability.” *See id.* (citing Ex. 1003 ¶¶ 62, 64).

Further, Petitioners contend a person of ordinary skill would have been motivated to combine the teachings of Huang with Paulraj because doing so also would have constituted applying well-known transmit diversity techniques to achieve predictable results. *Id.* at 36–37. Petitioners note that Paulraj expressly indicates that a diversity scheme based on spatial diversity (i.e., transmitting on spatially separate antennas) may be used, as distinguished from time diversity (i.e., transmitting at different times). *Id.* at 36 (citing Ex. 1005, 26:48–49; Ex. 1003 ¶ 66). According to Petitioners, such spatial transmit diversity techniques were well-known in the art, as evidenced by Huang, and even an ordinary artisan would have had a reasonable expectation of successfully and predictably achieving improved link reliability by applying those techniques. *Id.* at 36–37 (citing Ex. 1003 ¶ 69). Petitioners present Dr. Singer’s testimony as evidence that a person of ordinary skill would have recognized, and been motivated by, the benefits of applying transmit diversity to high priority transmissions in particular, especially based on Walton’s teachings. *Id.* at 39–40 (citing Ex. 1003 ¶ 73).

We find that the reasoning articulated by Petitioner is persuasive and has rational underpinning supported by the evidence, as explained above. *See KSR*, 550 U.S. at 418; *Kahn*, 441 F.3d at 988 (requiring “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”). Thus, we determine that Petitioner has established that a person of ordinary skill would have been motivated to combine the identified teachings of Paulraj, Walton, and Huang, in the manner set forth in the Petition, to arrive at the invention recited in claims 1 and 6. Patent Owner disputes Petitioners’ contentions, arguing that a skilled artisan would not have been motivated to combine the references and, in fact, would have

been taught away from such a combination. PO Resp. 35–43. As explained below, however, we are not persuaded by Patent Owner’s arguments.

More specifically, Patent Owner first asserts that Paulraj’s main objective was “improving transmission speed,” which teaches away from a combination with Walton because Walton was concerned with solving a different problem, i.e., “improving reliability.” *Id.* at 36–37. Patent Owner does not address, however, Paulraj’s teaching to also apply diversity techniques to “further improve the link reliability” (Ex. 1005, 6:10–13; *see* Pet. 30; Pet. Reply 17), which appears to indicate that such an objective would *not* “contravene the purpose of Paulraj” (PO Resp. 37). Moreover, with respect to its teaching away arguments, Patent Owner does not identify any portion of Paulraj that criticizes, discredits, or otherwise discourages the use of transmit diversity techniques, such as those of Walton, in combination with Paulraj’s system. *See In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004) (holding that teaching away was not established because the disclosure “does not criticize, discredit, or otherwise discourage” the claimed solution).

Further, Patent Owner also asserts that Walton teaches “spatial multiplexing for high data rates and diversity for low data rates,” i.e., “a single mode at a time,” and that such an approach is “incompatible” with simultaneity. PO Resp. 37 (citing Ex. 2002 ¶ 54). According to Patent Owner, “it would be nonsensical to make alternate symbols of datastream 176 to have different importance/priority” as taught by Walton, and such a combination also “would not work . . . because datastreams 176 and 182 are not transmitted at the same time.” *Id.* at 37–38. Petitioner, however, does not rely on the aspects of Walton relating to spatial multiplexing or using a

single mode at a time. Moreover, the alleged incompatibilities between Paulraj and Walton arise only when seeking to bodily incorporate Walton's transmit diversity disclosures into Paulraj's embodiments. *See id.*; PO Sur-reply 18–19. “The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference . . . [r]ather the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.” *Keller*, 642 F.2d at 425. Thus, it is irrelevant whether Walton's diversity scheme could be bodily incorporated to designate substreams of Paulraj's datastream 176, in particular, as higher priority.¹² *See* PO Resp. 37–38; PO Sur-reply 18–19. Rather, the obviousness inquiry is satisfied by Petitioner demonstrating that a person of ordinary skill would have been motivated to apply Walton's teachings of transmit diversity for higher priority transmissions with the system taught in Paulraj generally.

Patent Owner also contends a skilled artisan would not have been motivated to combine Paulraj with Huang. PO Resp. 38–41. According to Patent Owner, “Huang is incompatible with both Paulraj and Walton,” because Huang does not teach data items with different priorities (i.e., a “specific data item”) similar to Paulraj. *Id.* at 38–39. As discussed above, however, Petitioner does not rely on Huang to teach the recited “specific data item,” but rather relies on teachings in Walton to combine with Paulraj and Huang. Patent Owner does not explain why the lack of such a teaching in Huang makes Huang “incompatible” other than asserting that Huang, like

¹² As discussed above, Paulraj's teachings are not limited only to substreams of a single datastream.

Paulraj, describes transmitting substreams of one datastream. *See id.* This argument is not persuasive for the same reasons discussed above with respect to Paulraj.

Next, Patent Owner cites *Polaris Industries, Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1068–69 (Fed. Cir. 2018), arguing that Petitioner’s arguments for combining Paulraj/Walton, with Huang’s teaching of transmitting the same substream on multiple antennas at the same time, amount to an improper focus on what a skilled artisan could have done, rather than what the artisan would have been motivated to do. PO Resp. 40; *see* PO Sur-reply 20. Unlike in *Polaris*, however, Petitioner identifies specific teachings suggesting such a combination, and specific benefits that would have motivated a person of ordinary skill to include Huang’s teachings in the combination.

For example, Petitioner notes that Paulraj explicitly references implementing diversity in “space” (i.e., spatial diversity), which would have motivated a skilled artisan to look to Huang’s disclosure of a spatial diversity scheme, which further describes a substream and its replica transmitted from spatially separate antennas at the same time. Pet. 36–37 (citing Ex. 1005, 26:48–49; Ex. 1003 ¶¶ 66–69); Pet. Reply 18. Petitioner also relies on Dr. Singer, who testified that an ordinary artisan would have recognized Huang’s teaching to represent a transmit diversity technique that was well-known in the art to provide “improved link reliability.” Ex. 1003 ¶ 69; *see* Pet. 37.

Patent Owner additionally argues that an ordinary artisan would not have been motivated to combine Huang’s teachings with Paulraj and Walton because Huang is aimed at a different goal (i.e., “maximizing spectral

efficiency”), which teaches away from simultaneity. *See* PO Resp. 41; PO Sur-reply 21–22. As discussed above, however, Petitioner presents evidence that the added benefit of improved link quality would have motivated a skilled artisan to combine the asserted references, including Huang. Pet. 36–37 (citing Ex. 1003 ¶ 69). Thus, whether a *different* goal could lead an ordinary artisan in a different direction does not necessarily establish teaching away. Further, the cited portions of Huang indicate that using same-code transmission but not transmit diversity was recommended only “[f]or the range of parameters [Huang] considered,” namely when the number of receive antennas is “large” (e.g., twelve), to “achieve the highest spectral efficiency.” Ex. 1006, 41–42; *see* PO Sur-reply 21–22. In addition to the “highest spectral efficiency” being a different goal, we note that the challenged claims are not limited to a large number of receive antennas—indeed, they recite *no* limitations regarding *receive* antennas. Thus, we are not persuaded that these disclosures of Huang “criticize, discredit, or otherwise discourage the *solution claimed*,” as is required for a finding of teaching away. *See Fulton*, 391 F.3d at 1201.

Additionally, Patent Owner makes a number of conclusory allegations without providing any explanation or evidentiary support. Specifically, Patent Owner asserts that “neither Paulraj nor Huang address improving link reliability,” “Paulraj teaches against consumption of additional resources and bandwidth,” and “Walton warns against tradeoff between reliability and efficiency.” PO Resp. 41. Conclusory statements and mere attorney argument are entitled to little, if any, weight. Moreover, the record clearly belies at least some of these assertions. For example, Paulraj explicitly addresses link reliability in the context of diversity processing. *See*

Ex. 1005, 6:10–13 (teaching that “[a]dditional antennas on the transmit or receive side are then used for diversity purposes and further improve the link reliability”); Pet. Reply 17.

Finally, Patent Owner contends that a skilled artisan would not have had a reasonable expectation of success in combining the teachings of Huang with the other references. PO Resp. 42–43. According to Patent Owner, Huang “is reporting experimental results,” and “[t]here is no discussion in the Huang paper that the assumptions or experimental equipment of Huang will perform predictably in non-ideal applications.” *Id.* Petitioner does not rely on Huang’s “experimental results” or “experimental equipment,” however. Thus, it is irrelevant whether a skilled artisan would have had a reasonable expectation of success in combining them with the other references because no such combination is proposed. Relying on the credible testimony of Dr. Singer, Petitioner explains persuasively why a skilled artisan would have reasonably expected success and achieved predictable results in combining the identified teachings of Paulraj, Walton, and Huang. *See* Pet. 32–33, 36–37 (citing Ex. 1003 ¶¶ 61–62, 68–69).

b. Dependent Claims 2–5

As discussed above, Petitioner relies on Walton as teaching the use of transmit diversity “to achieve higher reliability for *certain* data transmissions,” such as “overhead channels on the downlink, such as broadcast, paging, and other common channels,” as well as when channel conditions are poor and other similar scenarios. Ex. 1008, 10:4–15 (emphasis added); Pet. 38. Petitioner asserts that these teachings read on the limitation of claim 2 that the specific data item of claim 1 “comprises user

data requiring a better communication quality than other user data.”

Pet. 38–39.

Claim 3 also depends from claim 1 and recites “in each antenna transmitting the specific data item and the replica data item, the transmitting section code division multiplexes different data from the specific data item upon the specific data item, and transmits the code division multiplexed data at the same time.” For these limitations, Petitioner identifies teachings in Paulraj regarding implementations in a CDMA (code-division multiple access) environment, including the use of “encoder/modulator clusters” that modulate substreams with a unique key code (i.e., code division multiplexes the substreams). Pet. 40–42.

With respect to claim 4 (“[a] communication terminal apparatus”) and claim 5 (“[a] base station apparatus”), Petitioner relies on Paulraj showing that the disclosed transmission system may be found in both a subscriber unit (i.e., communication terminal) and a BTS (i.e., base station). Pet. 43.

Patent Owner does not present any arguments specific to the dependent claims. Based on the complete trial record, we agree with Petitioner’s reasoning as described above, and we find that Petitioner has demonstrated by a preponderance of the evidence that the combination of Paulraj, Walton, and Huang teaches each limitation of claims 2–5 of the ’711 Patent.

3. *Alleged Obviousness Over Wallace and Walton*

Petitioner contends that all challenged claims of the ’711 Patent are obvious over the combined teachings of Wallace and Walton. Pet. 44–66. As explained above, the challenged claims require simultaneity. Petitioner’s contentions regarding this ground of unpatentability, however, are premised

on a reading of the claims that does *not* require simultaneity. *See* Pet. 44–45 (advancing this ground of unpatentability only “[t]o the extent the Challenged Claims are interpreted so broadly as to encompass switching between transmit diversity and spatial multiplexing modes”). Indeed, Petitioner only contends that “Wallace teaches *switching* between a pure diversity mode and a MIMO/spatial multiplexing mode.” *Id.* at 50 (emphasis added). As a result, we find that Petitioner has not shown that the combination of Wallace and Walton teach all the elements of the challenged claims, particularly the requirement of simultaneity.

4. *Secondary Considerations*

Although we find, as explained above, that the combination of Paulraj, Walton, and Huang teaches each limitation of the challenged claims, and that an ordinary artisan would have had sufficient reason to combine them to reach the claimed invention, we must additionally consider any evidence of secondary considerations of non-obviousness before reaching a conclusion as to the obviousness of any claim. *See Graham*, 383 U.S. at 17. Notwithstanding what the teachings of the prior art would have suggested to one of ordinary skill in the art at the time of the invention, the totality of the evidence submitted, including objective evidence of non-obviousness, may lead to a conclusion that the challenged claims would not have been obvious to a person of ordinary skill in the art. *In re Piasecki*, 745 F.2d 1468, 1471–72 (Fed. Cir. 1984).

“In order to accord substantial weight to secondary considerations in an obviousness analysis, the evidence of secondary considerations must have a nexus to the claims, i.e., there must be a legally and factually sufficient connection between the evidence and the patented invention.” *Fox Factory*,

Inc. v. SRAM, LLC, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (internal quotations omitted). A nexus is presumed when “the patentee shows that the asserted objective evidence is tied to a specific product and that product ‘embodies the claimed features, and is coextensive with them.’” *Id.* (quoting *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1072 (Fed. Cir. 2018)). If the product is not coextensive with the claims at issue—e.g., if the patented invention is only a component of the product—the patentee is not entitled to a presumption of nexus. *See id.* (citing *Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988)).

Patent Owner contends that (1) the adoption of the invention of the ’711 Patent as an industry standard, and (2) a license to the ’711 Patent taken by Samsung Electronics Co., Ltd., are compelling secondary considerations of non-obviousness.¹³ PO Resp. 47–51. We disagree.

First, Patent Owner provides a lengthy recounting of how “simultaneous PUCCH and PUSCH” was purportedly adopted as an industry standard by “3GPP RAN1.” *Id.* at 47–50. Absent from Patent Owner’s briefing, however, is an explanation of what “simultaneous PUCCH and PUSCH” is, or how it relates to the challenged claims, aside from conclusory assertions. Thus, Patent Owner has not demonstrated that

¹³ We note that Dr. Vojcic provides testimony regarding the alleged commercial success of “products incorporating the invention” of the ’711 Patent. Ex. 2002 ¶ 70. Patent Owner, however, does not present arguments regarding commercial success. Even were we to consider Dr. Vojcic testimony, his conclusory assertion falls far short of sufficient proof of commercial success. For example, Dr. Vojcic does not identify which products he is referring to, much less explain how any such product embodies, or is coextensive with, any of the challenged claims. *See id.*

the presumption of nexus applies—e.g., by demonstrating that the purported industry standard embodies the claimed features and is coextensive with them—nor has Patent Owner provided direct evidence of a nexus between the standard and the challenged claims. *See Fox Factory*, 944 F.3d at 1373. Dr. Vojcic also does not provide the required explanation or evidence of a nexus, because his testimony includes only conclusory statements that are not supported by any record evidence. *See* Ex. 2002 ¶ 69 (asserting without explanation, “simultaneous PUCCH and PUSCH transmission (the invention described in the ’711 Patent) . . . did not become part of the LTE+ standards until 2010,” and “[t]he ’711 Patent is essential to portions of the LTE+ standards”), ¶ 78 (similar). This testimony is entitled to little or no weight as a result, even if “unrebutted” (PO Sur-reply 23). *See* 37 C.F.R. § 42.65(a).

Second, as Petitioner notes (Pet. Reply 21), Patent Owner also fails to provide key information regarding the Samsung license it relies on as evidence of non-obviousness. The license itself is not in the record. Instead, Patent Owner relies on a brief description of the license in a filing in a proceeding before the U.S. International Trade Commission. PO Resp. 50–51 (citing Ex. 2011). The only relevant information provided in this document is that Samsung holds a license to “the Asserted Patents,” which comprises the ’711 Patent and at least *four other patents*. Ex. 2011, 4. No information is provided about critical details of this license—e.g., the relative contributions of each of the patents in the portfolio to the value of the license, whether the license also encompasses other unidentified patents, whether the license was taken to settle litigation—such that we could discern whether Samsung took the license “out of recognition and acceptance of the subject matter claimed” in the ’711 Patent. *See In re GPAC Inc.*, 57 F.3d

1573, 1580 (Fed. Cir. 1995). We find that Patent Owner has not provided sufficient evidence to establish the requisite nexus between the Samsung license and the '711 Patent, whether under a presumption or otherwise.

For the above reasons, we conclude that Patent Owner's evidence of secondary considerations cannot be afforded substantial weight, and in any event constitutes weak evidence of non-obviousness. *See Fox Factory*, 944 F.3d at 1373.

9. *Conclusion as to Obviousness*

As discussed above, Petitioner has shown by a preponderance of the evidence that the asserted prior art teaches each limitation of the challenged claims. We further determine that Petitioner's showing that the claims are taught by the asserted art is strong, particularly in comparison to Patent Owner's weak showing with respect to the asserted secondary considerations of non-obviousness. As discussed above, we find that Patent Owner has not established the requisite nexus between the challenged claims and its evidence of purported industry acceptance and licensing. As such, we are unable to accord them any substantial weight. *See Fox Factory*, 944 F.3d at 1373. Thus, in weighing the totality of the evidence of record and the strength of the parties' showings on the inquiries underlying the question of obviousness, we conclude that Petitioner has met its overall burden of proving by a preponderance of the evidence that each of the challenged claims would have been obvious in view of the asserted prior art.

CONCLUSION¹⁴

For the foregoing reasons, Petitioner has shown by a preponderance of the evidence that the challenged claims of the '711 Patent are unpatentable, as summarized in the following table:

Claims	35 U.S.C. §	References/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–6	103(a)	Paulraj, Walton, Huang	1–6	
1–6	103(a)	Wallace, Walton		1–6
Overall Outcome			1–6	

¹⁴ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–6 of the '711 Patent are held unpatentable as obvious under 35 U.S.C. § 103(a) in view of the combination of Paulraj, Walton, and Huang; and

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

IPR2018-01476
Patent 7,764,711 B2

For PETITIONER:

Adam P. Seitz
Paul R. Hart
Callie A. Pendergrass
ERISE IP, P.A.
Adam.Seitz@eriseip.com
Paul.Hart@eriseip.com
Callie.Pendergrass@eriseip.com

Stephen Korniczky
Martin Bader
Nam Kim
Ericka Schulz
SHEPPARD MULLIN RICHTER & HAMPTON LLP
skorniczky@sheppardmullin.com
mbader@sheppardmullin.com
nkim@sheppardmullin.com
eschulz@sheppardmullin.com

Bing Ai
Vinay Sathe
Babak Tehrani
Kevin Patariu
John Schnurer
PERKINS COIE LLP
Ai-ptab@perkinscoie.com
VSathe@perkinscoie.com
BTehranchi@perkinscoie.com
KPatariu@perkinscoie.com
JSchnurer@perkinscoie.com

For PATENT OWNER:

Cyrus A. Morton
Bryan J. Vogel
Derrick J. Carman
Stephanie A. Diehl

IPR2018-01476
Patent 7,764,711 B2

Li Zhu
Shui Li
ROBINS KAPLAN LLP
cmorton@robinskaplan.com
bvogel@robinskaplan.com
dcarman@robinskaplan.com
sdiehl@robinskaplan.com
lzhu@robinskaplan.com
sli@robinskaplan.com