

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

RUCKUS WIRELESS, INC., ARRIS SOLUTIONS, INC.,
NETGEAR, INC., and BELKIN INTERNATIONAL, INC.
Petitioner

v.

XR COMMUNICATIONS, LLC d/b/a VIVATO TECHNOLOGIES
Patent Owner

IPR2018-01017
Patent 7,062,296 B2

Before BARBARA A. PARVIS, TERRENCE W. MCMILLIN, and
JAMES J. MAYBERRY, *Administrative Patent Judges*.

PARVIS, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
Denying Patent Owner's Motion to Amend
35 U.S.C. § 318(a)

I. INTRODUCTION

Ruckus Wireless, Inc., ARRIS Solutions, Inc., Netgear, Inc., and Belkin International, Inc. (“Petitioner”) filed a Petition (Paper 1, “Pet.”) to institute an *inter partes* review of claims, 1, 2, 4–7, 17, 18, 20–23, 33, and 35–38 (“the challenged claims”) of U.S. Patent No. 7,062,296 B2 (Ex. 1001, “the ’296 Patent”).¹ XR Communications, LLC d/b/a Vivato Technologies (“Patent Owner”) filed a Preliminary Response. Paper 9 (“Prelim. Resp.”). Upon consideration of the parties’ contentions and supporting evidence, we instituted an *inter partes* review pursuant to 35 U.S.C. § 314, as to the challenged claims of the ’296 Patent. Paper 12 (“Inst. Dec.”).

After institution, Patent Owner filed a Patent Owner Response (Paper 24, “PO Resp.”), and a Motion to Amend (Paper 25, “Mot. to Amend”). Petitioner filed a Reply (Paper 31, “Pet. Reply”) and an Opposition to Patent Owner’s Motion to Amend (Paper 32, “MTA Opp.”). Patent Owner filed a Sur-Reply (Paper 35, “PO Sur-Reply”) and a Reply to Petitioner’s Opposition to the Motion to Amend (Paper 34, “MTA Reply”). Petitioner filed a Sur-Reply to Patent Owner’s Reply to the Opposition to the Motion to Amend (Paper 40, “MTA Sur-Reply”). A transcript of the hearing held on July 19, 2019, has been entered into the record as Paper 43 (“Tr.”).

This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a). For the reasons that follow, we determine that Petitioner has demonstrated by a preponderance of evidence that the challenged claims of the ’296 Patent are unpatentable. Additionally, we deny Patent Owner’s Motion to Amend.

¹ Petitioner omits claim 6 from certain listings of the challenged claims (*see, e.g.*, Pet. 1), but presents contentions for claim 6 (*id.* at 56–58). We treat Petitioner’s omission as a typographical error.

A. *Related Matters*

As required by 37 C.F.R. § 42.8(b)(2), each party identifies judicial and administrative matters that would affect, or be affected by, a decision in this proceeding. In particular, the parties inform us that the '296 Patent is the subject of district court proceedings as follows: *XR Communications, LLC d/b/a Vivato Technologies v. ARRIS International plc et al.*, 8-18-cv-00192 (C.D. Cal.), filed February 2, 2018; *XR Communications, LLC d/b/a Vivato Technologies v. Aruba Networks, Inc.*, 2-17-cv-02945 (C.D. Cal.), filed April 19, 2017; *XR Communications, LLC d/b/a Vivato Technologies v. Newo Corp. d/b/a Amped Wireless*, 5-17-cv-00744 (C.D. Cal.), filed April 19, 2017; *XR Communications, LLC d/b/a Vivato Technologies v. ASUS Computer International et al.*, 2-17-cv-02948 (C.D. Cal.), filed April 19, 2017; *XR Communications, LLC d/b/a Vivato Technologies v. Cisco Systems, Inc.*, 2-17-cv-02951 (C.D. Cal.), filed April 19, 2017; *XR Communications, LLC d/b/a Vivato Technologies v. Extreme Networks, Inc.*, 2-17-cv-02953 (C.D. Cal.), filed April 19, 2017; *XR Communications, LLC d/b/a Vivato Technologies v. NETGEAR, Inc.*, 2-17-cv-02959 (C.D. Cal.), filed April 19, 2017; *XR Communications, LLC d/b/a Vivato Technologies v. Ruckus Wireless, Inc.*, 2-17-cv-02961 (C.D. Cal.), filed April 19, 2017; *XR Communications, LLC d/b/a Vivato Technologies v. Ubiquiti Networks, Inc.*, 2-17-cv-02968 (C.D. Cal.), filed April 19, 2017; *XR Communications, LLC d/b/a Vivato Technologies v. Belkin International, Inc.*, 8-17-cv-00674 (C.D. Cal.), filed April 13, 2017; *XR Communications, LLC d/b/a Vivato Technologies v. D-Link Systems, Inc.*, Case No. 8:17-cv-00596 (C.D. Cal.), filed April 3, 2017; and *XR Communications, LLC d/b/a Vivato Technologies v. Xirrus, Inc.*, 3-17-cv-00675 (C.D. Cal.), filed April 3, 2017. Pet. 2–3; Paper 4, 1–4.

The parties further state the '296 Patent is the subject of other petitions for *inter partes* review in IPR2018-00725 and IPR2018-00764. *Id.* Final Written Decisions were entered in both those proceedings in September 2019.

B. The '296 Patent

The '296 Patent is directed to a method and apparatus for allowing a wireless communication system using a smart antenna to cause a receiving device to switch from one transmitted beam to another transmitted beam. Ex. 1001, 1:15–20. According to the '296 Patent, in wireless communications that use smart antennas, a receiving device has difficulty switching from one beam to another beam because the smart antenna produces narrower, directed beams as compared to conventional, omni-directional antennas. *Id.* at 2:25–31.

Figure 1 of the '296 Patent is reproduced below.

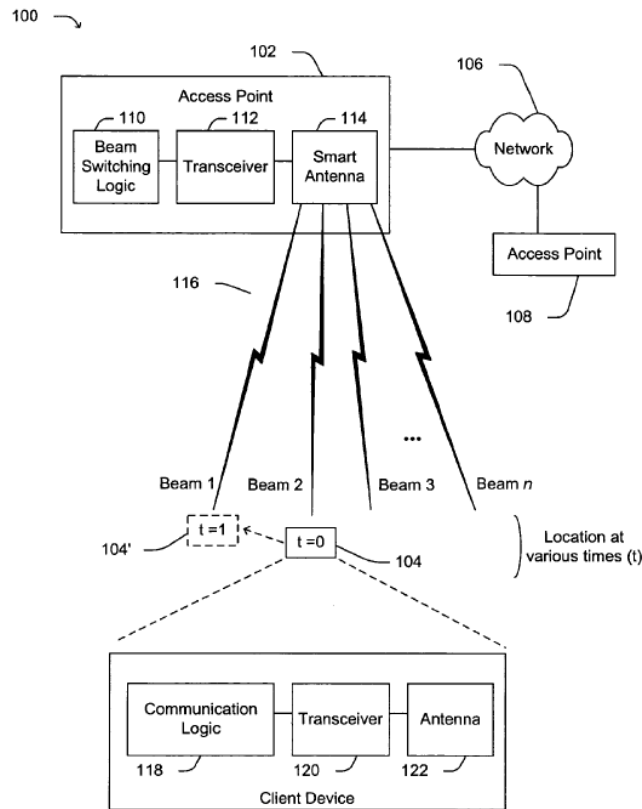


Fig. 1

Figure 1 of the '296 Patent, above, illustrates a block diagram of wireless communications system 100 having access point 102 in communication with client 104 over one of main beams 116. Ex. 1001, 5:1–3. As shown in Figure 1 of the '296 Patent, access point 102 includes beam switching logic 110, smart antenna 114, and transceiver 112, which is coupled to beam switching logic 110 and smart antenna 114. *Id.* at 5:3–6, Fig. 1. Smart antenna 114 transmits main beams 116 in correspondence with transmit signals output by transceiver 112 and receives signals transmitted by client 104. *Id.* at 5:6–16.

Access point 102 is configured to cause receiving client 104 to switch between main beams 116. *Id.* at 4:61–65. In particular, beam switching logic 110 detects the location of client 104. *Id.* at 5:47–49. When beam

switching logic 110 determines that client 104 is associated with the “wrong beam,” beam switching logic 110 causes client 104 to re-associate with another one of main beams 116 by altering the operation of transceiver 112. *Id.* at 5:55–60.

C. Illustrative Claim

Petitioner challenges claims 1, 2, 4–7, 17, 18, 20–23, 33, and 35–38 of the ’296 Patent. Pet. 5. Claims 1, 17, and 33 are independent claims. Each of claims 2, 4–7, 18, 20–23, and 35–38 depends, directly or indirectly, from one of claims 1, 17, and 33. Independent claim 1, reproduced below, is illustrative of the claimed subject matter:

1. A method for use in a wireless communication system, the method comprising:
 - [1a] configuring a first device having a smart antenna to selectively allow a second device to operatively associate with a beam downlink transmittable to said second device using said smart antenna;
 - [1b] configuring said first device to determine information from at least one uplink transmission receivable from said second device through said smart antenna;
 - [1c] configuring said first device to determine if said associated second device should operatively associate with a different beam downlink transmittable using said smart antenna based on said determined information; and
 - [1d] if said associated second device should operatively associate with a different beam, then configuring said first device to allow said second device to operatively associate with said different beam by at least one of configuring said first device to identify that said second device is allowed to operatively associate with said different beam, or configuring said first device to identify that said second device is not allowed to operatively associate with said beam.

Ex. 1001, 10:57–11:11.²

D. Prior Art and Asserted Ground

Petitioner asserts that claims 1, 2, 4–7, 17, 18, 20–23, 33, and 35–38 would have been unpatentable on the following ground:

Claims Challenged	Statutory Basis	References
1, 2, 4–7, 17, 18, 20–23, 33, and 35–38	§ 103(a) ³	Reudink ⁴ and Antonio ⁵

The earliest priority date claimed for the '296 Patent is November 4, 2002. Ex. 1001, at code (60). Reudink was filed October 19, 1999, and issued May 2, 2006. Ex. 1009, at code (22). Antonio issued March 27, 2001. Ex. 1010, at code (45). Patent Owner does not challenge the prior art status of the cited references. *See generally* PO Resp.; Tr. 7:14–16, 34:25–27. We determine that the cited art qualifies as prior art to the '296 Patent.

The parties also submit Declarations in support of their arguments. In particular, Petitioner submits a Declaration of Kevin Negus, Ph.D., who has been retained by Petitioner for the instant proceeding. Ex. 1006 ¶ 1. In support of its Opposition to the Motion to Amend, Petitioner proffers an additional declaration of Dr. Negus. Ex. 1020.

² Above we insert Petitioner's references for limitations recited in claim 1 that we use herein. *See* Pet. 29, 32, 35, 39.

³ The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. § 103. Because the '296 Patent was filed before the effective date of the relevant amendment, the pre-AIA version of § 103 applies.

⁴ U.S. Patent No. 7,039,441 B1, filed Oct. 19, 1999, issued May 2, 2006 (Ex. 1009, "Reudink").

⁵ U.S. Patent No. 6,208,858 B1 filed July 21, 1998, issued Mar. 27, 2001 (Ex. 1010, "Antonio").

Patent Owner submits a Declaration of Robert Short, Ph.D., who has been retained by Patent Owner for the instant proceeding. Ex. 2002 ¶ 1. In support of its Motion to Amend, Patent Owner proffers additional Declarations of Dr. Short. Ex. 2004 (supporting Motion to Amend); Ex. 2011 (supporting Reply to Opposition to Motion to Amend).

II. DISCUSSION

A. *Principles of Law Relating to Obviousness*

A patent claim is unpatentable 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. 35 U.S.C. § 103(a) (2006). 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 the art; and (4) objective evidence of nonobviousness, i.e., secondary considerations.⁶ See *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). When evaluating a combination of teachings, we also “determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

B. *Level of Ordinary Skill*

In determining the level of ordinary skill in the art, various factors may be considered, including the “type of problems encountered in the art;

⁶ The record does not include evidence of secondary considerations of nonobviousness.

prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citation omitted). Petitioner contends, relying on the testimony of Dr. Negus, that a person of ordinary skill in the art would have had a Master’s degree in Electrical Engineering, or an equivalent field, and two years of experience in the field of wireless communications or a Bachelor of Science in Electrical Engineering, or an equivalent field, and three to four years of experience in the field of wireless communications. Pet. 27–28 (citing Ex. 1006 ¶ 29). Patent Owner does not dispute Petitioner’s proposed level of ordinary skill or propose an alternative. *See generally* PO Resp.

We adopt Dr. Negus’s assessment of a person with ordinary skill in the art because it is consistent with the problems and solutions in the prior art of record. We further note that the prior art of record in the instant proceeding reflects the appropriate level of ordinary skill in the art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1354–55 (Fed. Cir. 2001) (“the prior art itself reflects an appropriate level” of ordinary skill in the art).

C. Claim Construction

In an *inter partes* review, we construe claim terms in an unexpired patent according to their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b) (2017).⁷

⁷ The claim construction standard to be employed in an *inter partes* review recently changed. *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) (amending 37 C.F.R. § 42.100(b) effective November 13, 2018). At the time of the filing of the

1. “*smart antenna*” and “*access point*”

Petitioner proposes constructions for the terms “smart antenna” and “access point.” Pet. 25–27. In our Decision to Institute, we determined that “the term ‘smart antenna’ does not need to be construed expressly to resolve the parties’ controversies.” Inst. Dec. 9. We determined that “‘access point’ as used in the ’296 Patent includes a base station” and we found “Petitioner’s showing of Reudink’s base station sufficient for teaching ‘access point device’ recited in claims 2 and 18.” *Id.* at 10.

Neither party disputes our determinations or findings in the Decision to Institute. *See generally* Pet. Reply; PO Resp. We determine that no further determinations need to be made regarding an express construction of “smart antenna” and “access point” to resolve the parties’ controversies. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017), *cert. denied*, 138 S. Ct. 1695 (April 30, 2018) (noting that “we need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’”) (citing *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

2. “*configuring said first device to determine if said associated second device should operatively associate with a different beam*”

Each of claims 1 and 17 recites “configuring said first device to determine if said associated second device should operatively associate with a different beam.” Ex. 1001, 10:66–11:1, 13:31–33. Claim 33 recites “logic . . . configured to . . . determine if said associated second device should operatively associate with a different beam.” *Id.* at 15:48–55. The parties

Petition in this proceeding, however, the applicable claim construction standard was set forth in 37 C.F.R. § 42.100(b) (2017).

agree these recitations should be treated the same. PO Resp. 25; *see generally* Pet. Reply.

Petitioner contends “operatively associate with” should be construed to be at least as broad as “establish a communication link with.” Pet. 26 (citing Ex. 1001, 6:13–16; Ex. 1006 ¶ 112). In our Decision to Institute, we discussed the parties’ contentions regarding “operatively associate with” and determined that Petitioner’s showing was sufficient even using Patent Owner’s proposal that the claims require the device to be *already* operatively associated with one beam before switching to a *different* beam. Inst. Dec. 9–10. We, therefore, determined no express construction was needed for “operatively associate with.” *Id.* Neither party disputes our determinations or findings regarding “operatively associate with” in the Decision to Institute. *See generally* Pet. Reply; PO Resp.

Patent Owner contends “the Federal Circuit has distinguished ‘configured to’ as narrower than ‘capable of’ or ‘suited to’” and, therefore, “the ‘first device’ must be specifically designed to ‘**determine if** said associated second device should operatively associate with a different beam.’” PO Resp. 6–8. Patent Owner contends, therefore, the asserted prior art is deficient because it describes “determining the beam to which the remote station should be assigned, *without* determining whether that preferred beam is a ‘different beam.’” PO Resp. 15 (cited in Sur-Reply 3). Patent Owner contends further that the claims require determining whether the beam is different by identifying the current beam. *See* Sur-Reply 4 (asserting the prior art is deficient because “the identity of a remote stations ‘current beam’ is irrelevant” and, therefore, no determination is made “as to whether a ‘different beam’ should be used”); *id.* at 6 (asserting the prior art is deficient because it “does not teach that this assignment process takes into

account the identity of the current beam of the remote station”); *id.* at 14 (asserting the prior art is deficient because it makes a determination “without comparison of the identified best beam to the remote stations current beam”).

Petitioner does not dispute that “configured to” is narrower than “capable of” and “suited to.” *See generally* Pet. Reply; Tr. Petitioner contends that Patent Owner improperly “compares the prior art to the embodiments” of the ’296 Patent. Pet. Reply 16. Other than the terms “smart antenna” and “operatively associate with” (Pet. 25–26), Petitioner contends the remainder of the recitation should be given its plain and ordinary meaning and no further express construction is needed. *See, e.g.*, Pet. Reply 5, 16.

Each of claims 1 and 17 recites “configuring said first device to determine if said associated second device should operatively associate with a different beam.” Ex. 1001, 10:66–11:1. The limitation is commensurately recited in claim 33. We agree with Petitioner that Patent Owner relies on preferred embodiments in the ’296 Patent Specification rather than claim limitations in its arguments that the independent claims are distinguishable over the prior art. Pet. Reply 15–16. Patent Owner’s contentions regarding “configured to” (PO Resp. 7–8) do not support Patent Owner’s implied proposed construction that the claims require identifying the current beam. *See, e.g.*, PO Sur-Reply 4, 6, 14. Also, Patent Owner’s implied proposed construction is explained only in Patent Owner’s Sur-Reply and is nothing more than importing an embodiment of the ’296 Patent Specification into the claims.

In applying a broadest reasonable construction, claim terms generally are given their ordinary and customary meaning, as would be understood by

one of ordinary skill in the art in the context of the entire disclosure. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

Additionally, we must be careful not to read a particular embodiment appearing in the written description into the claim if the claim language is broader than the embodiment. *See In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993).

Accordingly, we agree with Petitioner that the aforementioned limitation should be given its plain and ordinary meaning and no further express construction is needed, except we conclude that the language of the claims does not require identifying the current beam, as Patent Owner proposes.⁸

D. Obviousness over Reudink and Antonio

Petitioner contends each of claims 1, 2, 4–7, 17, 18, 20–23, 33, and 35–38 of the '296 Patent are unpatentable, under 35 U.S.C. § 103(a), as obvious over Reudink and Antonio. Pet. 5, 28–71. Patent Owner opposes. *See generally* PO Resp. In our discussion below, we first provide a brief overview of the prior art, and then we address the parties' contentions in turn.

1. Overview of Reudink

Reudink is directed to wireless communication systems and providing high data bandwidth channels at a plurality of base stations optimizing use

⁸ Nonetheless, for the reasons given below in Section II.D.3, we are persuaded that the asserted prior art combination teaches that preferred embodiment.

of the radio frequency spectrum. Ex. 1009, 1:6–10. Figure 2A of Reudink is reproduced below.

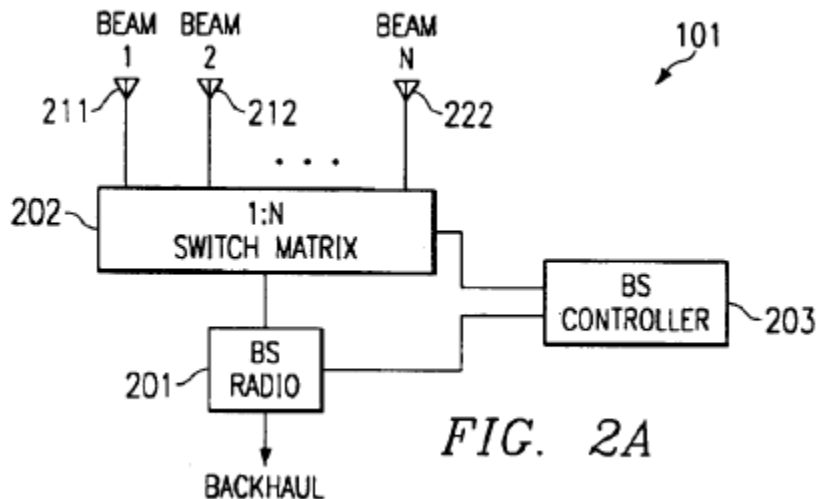


Figure 2A of Reudink, above, illustrates base station (BS) 101 (*id.* at 6:14–15, 6:53, 8:22) having BS radio 201 coupled to antennas 211–222 through switch matrix 202 (*id.* at 8:22–23). Switch matrix 202 directs energy between antennas 211–222 and BS radio 201 (into and out of beams 1–N) on command. *Id.* at 8:23–25. BS controller 203 is a processor based control system that controls switch matrix 202 and BS radio 201. *Id.* at 8:25–27. BS 101 is adapted to having a set of narrow antenna beams, in particular 12 narrow beams, providing wireless communication within a cell. *Id.* at 7:61–8:8. High data rate communications are provided to geographically-dispersed remote stations (RSs). *Id.* at 6:57–58.

Reudink further describes using a multiple beam antenna access channel (MBAACH) data container to transmit information including received signal strength indicator (RSSI) information, the number of antenna beams, and the current antenna beam. *Id.* at 11:45–61; 15:33. The RS measures signal strengths and logs the carrier numbers and beam numbers

that produce the strongest received signal strengths. *Id.* at 12:14–28. The RS adjusts its antenna beam angle to the strongest BS beam and transmits the reverse MBAACH to the appropriate BS. *Id.* at 12:28–35.

2. Overview of Antonio

Antonio is directed to a method for reducing call dropping in a wireless communication system having multiple beam communication links. Ex. 1010, 1:17–21. Figure 1 of Antonio is reproduced below.

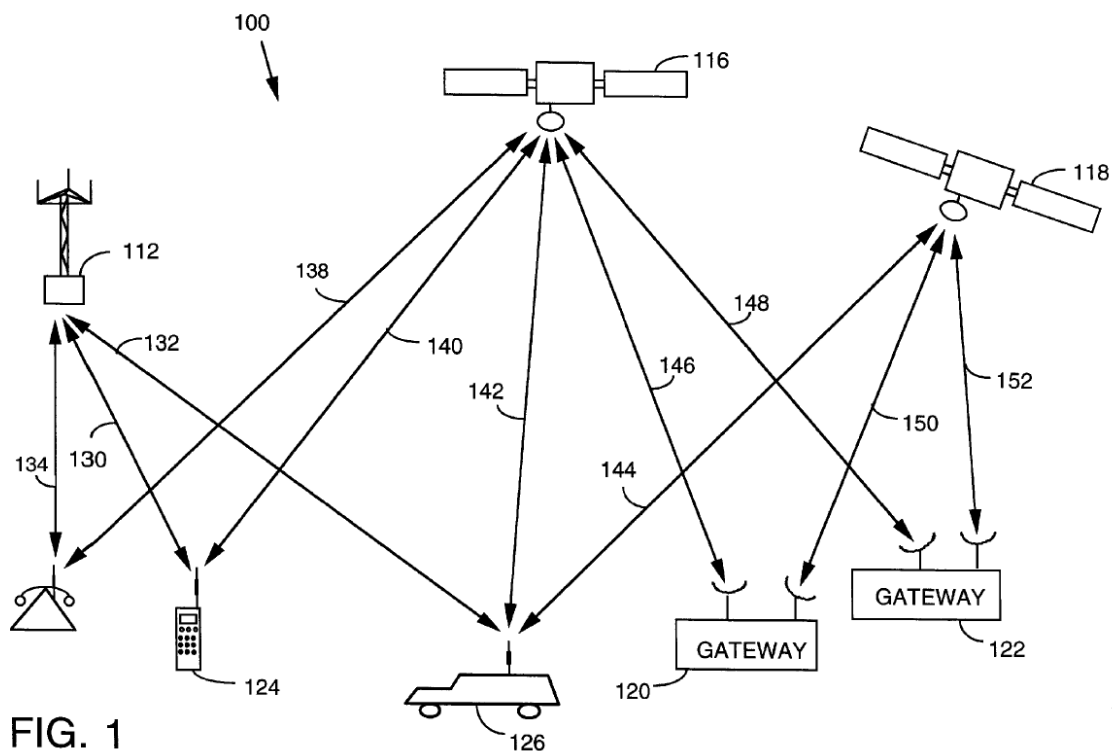


Figure 1 of Antonio, above, illustrates a wireless communication system 100 having base station 112, satellites 116 and 118, gateways 120 and 122, and user terminals 124, 126, and 128. *Id.* at 6:1–5. Base station 112 projects beams within a cell covering a predetermined service area on the Earth's surface. *Id.* at 7:25–27. Each of user terminals 124, 126, and 128 is a wireless communication device and also is referred to as a subscriber unit or a mobile station. *Id.* at 6:26–35. As shown in Figure 1,

signal paths are used for establishing communications between user terminals 124, 126, and 128 and base station 112 through satellites 116 and 118 with gateways 120 and 122. *Id.* at 6:60–63.

According to Antonio, a beam handoff procedure begins by a gateway transmitting a Beam Mask Message (BMM) containing a list of beam identifiers to a user terminal. *Id.* at 8:55–58. The user terminal measures the beam strength of each beam identified in the most recent BMM. *Id.* at 9:11–13. The user terminal transmits a Pilot Strength Measurement Message (PSMM) to the gateway. *Id.* at 9:57–59. The PSMM contains one or more beam identifiers from the BMM and corresponding beam strength values. *Id.* at 10:16–18.

3. *Discussion of Claim 1*

We begin our analysis with independent claim 1. Petitioner asserts that the combination of Reudink and Antonio renders claim 1 obvious. Pet. 11–24, 28–46. Petitioner provides detailed explanations as to how the prior art combination purportedly teaches or suggests each limitation of claim 1, and provides purported reasons why one of ordinary skill would have combined the prior art teachings, citing Dr. Negus’s testimony for support. *Id.* (citing, *e.g.*, Ex. 1006).

Patent Owner counters that Petitioner (1) does not show the asserted prior art combination teaches “configuring said first device to determine if said associated second device should operatively associate with a different beam” (PO Resp. 5–20) and (2) fails to present reasoning to modify Reudink’s system (*id.* at 20–24).

Based on the record before us, Petitioner has shown how the combined teachings of Reudink and Antonio teach or suggest each limitation

of claim 1 and we agree with Petitioner that a skilled artisan would have been motivated to combine the references for the reasons cited by Petitioner. We determine that Patent Owner's arguments do not undermine Petitioner's showing.

a. Limitation-by-Limitation Analysis

i. Preamble

We start with the preamble of claim 1, which recites “[a] method for use in a wireless communication system.” Ex. 1001, 10:57–58. Petitioner contends “[i]f the preamble is limiting, Reudink discloses it.” Pet. 28 (citing Ex. 1009, 1:6–10; Ex. 1006 ¶¶ 241–247). Reudink discloses the “invention relates to *wireless communication systems*.” Ex. 1009, 1:6 (emphasis added). Because Petitioner makes the requisite showing that Reudink discloses the subject matter recited in the preamble and Patent Owner does not dispute Petitioner's showing, for purposes of making determinations regarding claim 1, we assume, without deciding, that the preamble is limiting and determine that Reudink teaches it.

ii. Limitation 1a

We turn to the first recitation in claim 1 referred to by Petitioner as “1a” (Pet. 29), i.e., “configuring a first device having a smart antenna to selectively allow a second device to operatively associate with a beam downlink transmittable to said second device using said smart antenna.” Ex. 1001, 10:59–61. Petitioner points to Reudink's teachings relating to base stations having multi-beam smart antennas, as well as the messaging protocol used by the base stations for beam selection, and cites to Dr. Negus's testimony as support. Pet. 29–32 (citing Ex. 1009, at code (57),

1:14–39, 2:64–3:4, 3:46–59, 6:15–16, 7:1–4, 7:61–67, 8:1–13, 8:22–25, 10:49–56, 12:36–13:9, 13:29–33, 19:23–26, Fig. 2A; Ex. 1006 ¶¶ 253–257, 263, 265, 268–271, 273). For the first device, Petitioner points to Reudink’s teaching of base stations having multi-beam smart antennas. *See, e.g., id.* at 29–30 (citing Ex. 1009, at code (57), 1:14–39, 2:64–3:4, 3:46–59, 6:15–16, 7:1–4, 7:61–67, 8:1–13, 8:22–25, Fig. 2A; Ex. 1006 ¶¶ 253–257, 263, 273). For the second device, Petitioner points to Reudink’s teaching of remote stations that communicate with the base stations. *Id.* at 29–32 (citing *e.g.*, Ex. 1009, at code (57), 1:14–39, 2:64–3:4, 3:46–59; Ex. 1006 ¶¶ 253–257, 273).

We agree with Petitioner’s contentions and we credit and give significant weight to the testimony of Dr. Negus because both are consistent with the evidence of record. For example, Reudink discloses:

BS 101 adapted according to the present invention is shown in FIG. 1 as having a set of, preferably 12, narrow antenna beams (beams 111–122) providing wireless communication within cell 102. BS 101 is preferably adapted to direct energy into and out of any antenna beam on command. A preferred embodiment of circuitry of BS 101 adapted as described above is shown in FIG. 2.

Ex. 1009, 7:61–67. Reudink further describes the base station providing wireless signal coverage to remote stations in the area. *See, e.g., id.* at 1:14–39, 2:64–3:4.

Regarding the requirement of “a first device having a smart antenna *to selectively allow a second device to operatively associate with a beam downlink transmittable,*” recited in claim element “1a” (Ex. 1001, 10:59–61 (emphasis added)), Petitioner asserts that Reudink’s “messaging protocol . . . allows the base station to select the best beam for a remote station’s communication by using the Multi-Beam Antenna Access Channel

(MBAACH).” Pet. 31 (citing Ex. 1009, 12:36–61). Petitioner, more specifically, asserts that the messaging involves Reudink’s base station transmitting a “direction message” with signal parameter information. *Id.* at 31–32 (citing Ex. 1009, 12:36–13:9, 13:29–33, 19:23–26, Fig. 14; Ex. 1006 ¶¶ 268–271). Relying on the testimony of Dr. Negus, Petitioner provides an annotated Figure 14 of Reudink depicting a direction message, which is reproduced below. *Id.* at 31; Ex. 1006 ¶ 268 (citing Ex. 1009, 12:52–61, Fig. 14).

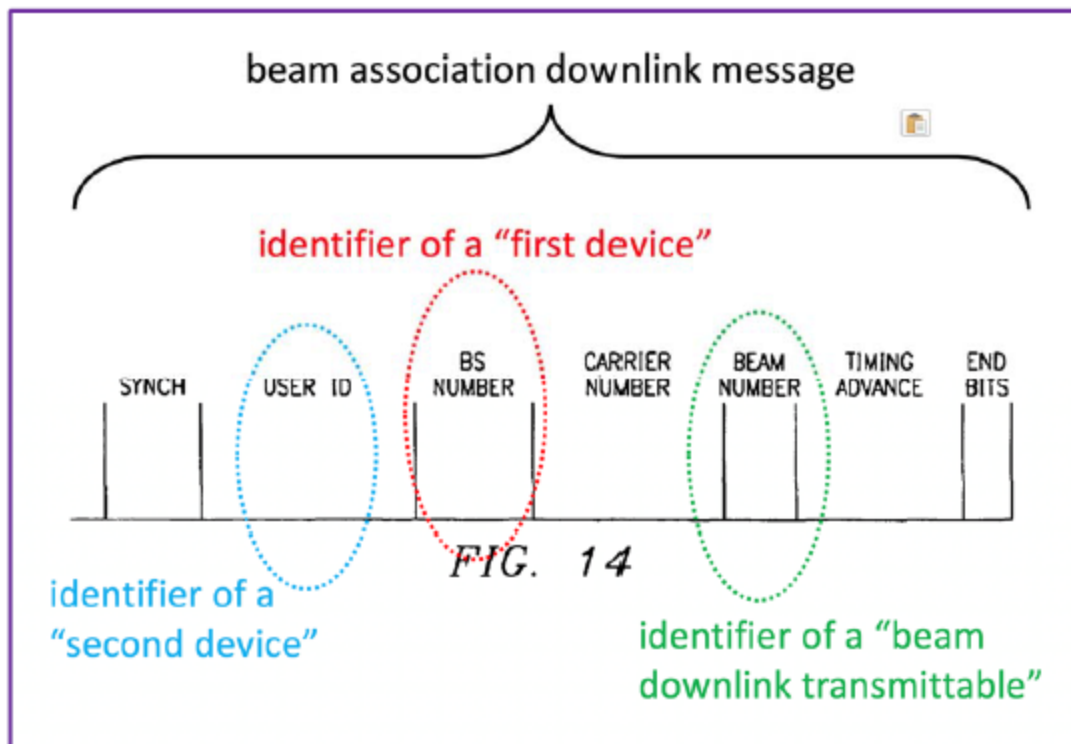


Figure 14 of Reudink above depicts a direction message including a user identifier annotated in blue, base station identification information annotated in red, and beam number identification information annotated in green. Pet. 31; Ex. 1006 ¶ 268.

We are persuaded by Petitioner's contentions and we credit and give significant weight to the testimony of Dr. Negus because both are consistent with the evidence of record. For instance, Reudink discloses:

[a]ccordingly, the greatest efficiency in the use of available resources according to a preferred embodiment of the present invention occurs when transmission and reception between a BS and RS occur only on a single antenna beam of the BS. According to a preferred embodiment, a most preferred antenna beam for communications with each active RS is identified and subsequent communication occurs using this most preferred antenna beam.

Ex. 1009, 10:49–56. Reudink describes that the “RS listens on a direction MBAACH portion of the channel” for a “direction message,” which instructs “the RS that the identified best carrier, angle and beam is acceptable for communication or, if unavailable, perhaps to look for another BS or RF carrier.” *Id.* at 12:53–59.

Regarding the direction message, Reudink, more specifically, discloses:

[a] preferred embodiment of the direction message from the BS is shown in FIG. 14. The preferred embodiment direction message includes synch bits, RS identification information, BS identification information, carrier number, antenna beam number, timing advance information, and end bits. The synch bits of the preferred embodiment set the beginning of the direction message. The RS identification information identifies the RS to which the direction message is directed. The BS identification information identifies the BS from which the direction message was sent. The carrier number identifies the carrier to which the direction message relates. The beam number identifies the beam to which the direction message relates. The timing advance information provides timing information related to the RSs relative position to the BS in order to allow reduced reliance on guard times in

communication of data packets. The end bits set the end of the direction message.

Id. at 12:60–13:9.

Patent Owner does not dispute Petitioner’s showing for the first recitation. We determine that Petitioner’s arguments and evidence demonstrate that Reudink teaches the first recitation in claim 1 (i.e., 1a).

iii. Limitation 1b

We now turn to the second recitation in claim 1, referred to by Petitioner as “1b” (Pet. 32), which is “configuring said first device to determine information from at least one uplink transmission receivable from said second device through said smart antenna.” Ex. 1001, 10:63–65. Petitioner points to Reudink’s teachings relating to the remote station providing signal strength information, and cites to Dr. Negus’s testimony as support. Pet. 32–34 (citing, *e.g.*, Ex. 1009, 3:46–59, 10:56–67, 11:1–4, 11:18–32, 12:14–18, 12:24–32, 12:39–61, 15:21–26, 15:31–36, 15:42–43, Fig. 13; Ex. 1006 ¶¶ 278, 283, 285–287, 289, 291–294, 306). Relying on the testimony of Dr. Negus, Petitioner provides an annotated Figure 13 of Reudink depicting a reverse MBAACH message, which is reproduced below. *Id.* at 34; Ex. 1006 ¶ 292 (citing Ex. 1009, 12:32–37, Fig. 13).

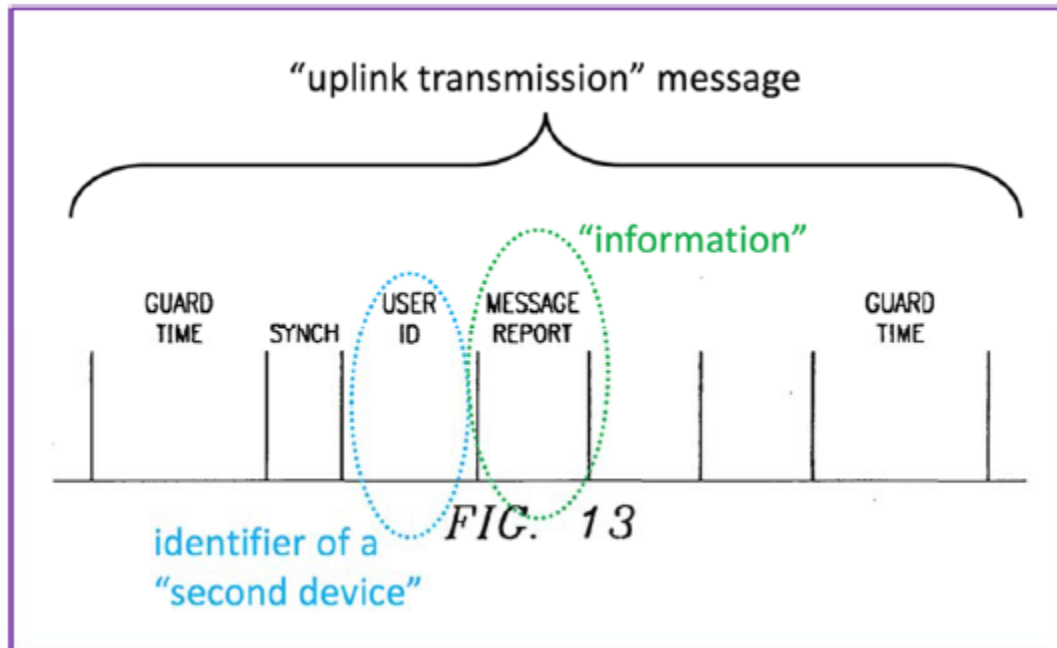


Figure 13 of Reudink above depicts a reverse MBAACH message including a user identifier annotated in blue and a message report annotated in green.

Id.

We are persuaded by Petitioner's contentions and we credit and give significant weight to the testimony of Dr. Negus because both are consistent with the evidence of record. For instance, Reudink discloses:

[p]referably, the most preferred antenna beam for each RS is an antenna beam having a "strongest" signal associated with that RS. It should be appreciated that the antenna beam determined according to the present invention to be the "strongest" may meet criteria other than or in addition to the received signal strength of greatest magnitude. For example, the determination of "strongest" may be made for an antenna beam having the best signal quality, i.e., highest SIR or SNR, the most direct path or shortest path, or the like. Likewise, an adaptive beam former can create a "strongest" beam to the RS using similar criteria.

Ex. 1009, 10:56–67.⁹ To make the determination, Reudink describes “[a]ccording to the preferred embodiment, the RS listens for the synch bursts and attempts to measure the signal strength.” *Id.* at 12:14–15. Reudink continues by describing “[t]he RS preferably logs the carrier numbers and the beam numbers that produce a strongest receive signal strength, for example a first and second most preferred carrier and beam combination may be determined.” *Id.* at 12:24–32; *see also id.* at 15:42–43 (“[E]ach or ones of the RSs may include signal quality measurement apparatus.”)

Reudink further discloses the remote station transmitting the most preferred carrier and beam combination, as follows:

A preferred embodiment reverse MBAACH data container is shown in FIG. 13. The preferred embodiment reverse MBAACH data container of FIG. 13 includes a leading and trailing guard time, synch bits, RS identification information, and report message. The guard times are adapted to prevent the RS from accidentally transmitting and overlapping its transmission with other RSs, i.e., the guard band insures that messages from distant RSs arrive within the time window of a time slot and do not overlap with other RSs on adjacent slots. The synch bits of the preferred embodiment set the beginning of the reverse MBAACH message. The RS identification information identifies the RS sending the reverse MBAACH message. The report message provides information such as carriers detected, angles and beam numbers above threshold, etcetera.

Id. at 12:37–51.

Patent Owner does not dispute Petitioner’s showing for the second recitation. Accordingly, we determine that Petitioner’s arguments and

⁹ “SIR” refers to signal-to-interference ratio and “SNR” refers to signal-to-noise ratio. *Id.* at 4:4–5.

evidence demonstrate that the asserted art teaches the second recitation in claim 1 (i.e., 1b).

iv. Limitation 1c

We next turn to the third recitation in claim 1, referred to by Petitioner as “1c” (Pet. 35), which is “configuring said first device to determine if said associated second device should operatively associate with a different beam downlink transmittable using said smart antenna based on said determined information.” Ex. 1001, 10:63–11:2. Petitioner asserts that Reudink discloses or renders this limitation obvious, and cites to Dr. Negus’s testimony as support. Pet. 35–39 (citing, *e.g.*, Ex. 1009, at code (57), 2:64–3:9, 3:46–59, 4:1–12, 4:51–56, 7:17–27, 11:36–43, 12:52–61, 15:11–20, 16:27–36, 16:42–58, 16:62–67, 18:4–32, 18:53–19:15, Figs. 5A, 5B; Ex. 1006 ¶¶ 313–317, 320, 329, 332–337, 339, 340, 345, 349–352). With respect to if the remote station “should operatively associate with a different beam downlink transmittable,” Petitioner points to Reudink’s teachings relating to determining preferred beams for mobile remote stations, changing to another beam or channel, and assigning beams to optimize network capacity, and cites to Dr. Negus’s testimony as support. *Id.* at 35, 36, 38, 39 (citing *e.g.*, Ex. 1009, at code (57), 2:64–3:9, 3:46–59, 4:1–12, 4:51–56, 11:36–43, 12:52–61, 15:11–20, 19:11–15; Ex. 1006 ¶¶ 313–317, 329, 332, 333, 340, 345, 349–352). With respect to the base station making this determination based on the “information from at least one uplink transmission,” Petitioner points to Reudink’s teachings relating to the direction message, as well as a forbidden beam matrix. Pet. 35–38 (citing, *e.g.*, Ex. 1009, 7:17–27, 11:36–43, 12:52–61, 15:11–20, 16:27–36, 16:42–

58, 16:62–67, 18:4–32, 18:53–19:15, Figs. 5A, 5B; Ex. 1006 ¶¶ 320, 329, 332–337, 339, 340).

Dr. Negus testifies that Reudink as understood by a person having ordinary skill in the art teaches limitation 1c. Dr. Negus quotes portions of Reudink expressly in his testimony that support his conclusion. For instance, Dr. Negus testifies that “Reudink teaches a situation ‘Where determination of a most preferred antenna beam is more time critical, such as where ones of the RSs are likely to change position and/or where propagation conditions are subject to material change.’” Ex. 1006 ¶ 332 (quoting Ex. 1006, 11:36–43). Dr. Negus also testifies “Reudink also notes that ‘the present invention provides for the use of a plurality of channels by ones of the RSs’ such that ‘although the use of a particular channel in a particular antenna beam may be prohibited or restricted as discussed above, an RS may change to another channel for communications, if desired.’” *Id.* ¶ 340 (quoting Ex. 1009, 19:11–15).

Dr. Negus testifies regarding his conclusion as follows:

Thus, Reudink discloses “configuring said first device” (such as the base station (BS) controlled by a BS controller) to “determine if said associated second device should operatively associate with a different beam downlink transmittable” (such as in a first instance where an RS changes position and/or propagation conditions, thereby resulting in a different antenna beam to be preferred, or such as in a second instance where an RS causes or receives inter-cell interference, thereby resulting in a different channel to be preferred wherein such channel is available only in combination with a different antenna beam, and wherein for either of such instances, such a different antenna beam may be overlapping or non-overlapping relative to some other antenna beam over which the RS may be capable of establishing communications with the network) using “said smart antenna” (such as the multiple beam antenna and its associated control circuitry described above).

Ex. 1006 ¶ 345.

Patent Owner contends Petitioner’s showing is deficient because it describes “determining the beam to which the remote station should be assigned, *without* determining whether that preferred beam is a ‘different beam.’” PO Resp. 15 (cited in PO Sur-Reply 3); PO Sur-Reply 1–3. Patent Owner’s contentions (*id.*; PO Sur-Reply 3–18) are premised on its overly narrow implied proposed construction that limitation 1c requires determining whether the beam is different by identifying the current beam, which we decline to adopt for the reasons given in Section II.C.2. Instead, we give limitation 1c its plain and ordinary meaning and determine no further express construction is needed, except that we conclude that the language of the claims does not require identifying the current beam, as Patent Owner proposes. *See supra* § II.C.2.

We note that Patent Owner disputed that Reudink teaches limitation 1c at the preliminary stage in the proceeding on the basis Reudink teaches only selecting an initial beam, but not switching to a different beam. *See generally* Prelim. Resp. 19. As discussed in our Decision to Institute, we determined that Petitioner has shown that Reudink also teaches a device being *already* operatively associated with one beam before switching to a *different* beam. Inst. Dec. 21–25. Based on the full record before us now for the reasons given above (*see* § II.D.3.a.ii) and in this Section, we are persuaded that Petitioner has shown that Reudink teaches limitation 1c in part because we again are persuaded that Reudink teaches a device being *already* operatively associated with one beam before switching to a *different* beam and we determine that Patent Owner’s arguments and evidence do not undermine Petitioner’s showing.

We turn to Petitioner's evidence summarized above regarding Reudink's determination if the second device (already operatively associated with one beam) should operatively associate with a *different* beam and Patent Owner's contentions, as both pertain to the plain and ordinary meaning of the claim language. In its Patent Owner Response, Patent Owner relies on testimony of Dr. Short that Reudink teaches periodically reassigning beam associations. Dr. Short, more specifically, testifies as follows:

Additionally, the proposed combination of Reudink with Antonio does not disclose or render obvious the claimed “[configuring/logic] . . . to determine if said associated second device should operatively associate with a different beam downlink,” because Reudink does not teach making an explicit determination of whether a different beam—i.e., a beam different than the current beam—should be selected. *See* Pet. at 35-39. For example, Reudink does not teach [] the base station being configured to perform a determination of whether a remote station is on the wrong beam and must be switched to a new beam, as described in the '296 patent. In reaching this conclusion, I have considered each of the Petition's allegations with respect to Reudink and this claim limitation, but have found them inadequate because none of the allegations actually show any determination by Reudink's base station as to whether a remote device should remain on a current beam or should switch to a different beam as the claims require. Rather, the Petition appears to only demonstrate that Reudink's base station can periodically reassign beam association(s) to the remote station, which beam assignment(s) may constitute the same beam(s) to which Reudink was already assigned, or different beam(s). I have also considered the Petition's obviousness allegations with respect to the “determin[ing] if” limitation, and find them inadequate because they do not provide a reason why a POSA would have been motivated to modify Reudink to add the missing “determin[ing] if” element of the claims. Rather, the Petition seems to assume a POSA that would have started with the claim language, and simply

worked backwards to redesign Reudink as necessary to meet the claims, which I understand is not a proper approach for evaluating obviousness.

Ex. 2004 ¶ 89.¹⁰

After consideration of Patent Owner's contentions and evidence, we are persuaded that Reudink teaches "configuring said first device to determine if said associated second device should operatively associate with a *different* beam downlink transmittable using said smart antenna" as recited in limitation 1c. Ex. 1001, 10:63–11:2 (emphasis added). We credit and give significant weight to the testimony of Dr. Negus (Ex. 1006) over Dr. Short (Ex. 2002; Ex. 2004),¹¹ because Dr. Negus's testimony is consistent with the portions of Reudink he quotes expressly in his testimony reproduced above, as well as with other of Reudink's disclosure. As background, as set forth in the summary of Petitioner's contentions and Dr. Negus's testimony above with respect to limitations 1a and 1b, Reudink

¹⁰ The acronyms "POSA" and "POSITA" appearing in this Decision refer to a person having ordinary skill in the art.

¹¹ Patent Owner asserts it relies on two Declarations of Dr. Short for the challenged claims, i.e., Exhibit 2002 and Exhibit 2004. Tr. 39:22–25. Patent Owner refers to Exhibit 2002 as "Short Decl." and Exhibit 2004 as "Ex. 2004" in its Patent Owner Response. PO Resp. 2, 14. As explained below, in its Motion to Amend, Patent Owner refers to "Ex. 2003" as "Short Decl.," but this is a typographical error and Patent Owner in its Motion to Amend appears to rely on Exhibit 2004 and refers to it using the same name used for Exhibit 2002 in its Patent Owner Response. *See supra* § II.E.2. We have considered Patent Owner's evidence presented in Exhibits 2002 and 2004 to the fullest extent possible in view of Patent Owner's arguments and explanations. Patent Owner, however, is required to explain clearly the relevance of all the evidence Patent Owner relies on in its Patent Owner Response. *See* 37 C.F.R. §§ 42.22; 42.23 (2019); *see also* Paper 13, 5 ("Patent Owner is cautioned that any arguments for patentability not raised in the response may be deemed waived.")

describes “[a]ccording to the preferred embodiment, the RS listens for the synch bursts and attempts to measure the signal strength.” Ex. 1009, 12:14–15. Reudink continues by describing “[t]he RS preferably logs the carrier numbers and the beam numbers that produce a strongest receive signal strength, for example a first and second most preferred carrier and beam combination may be determined.” *Id.* at 12:24–32; *see also id.* at 15:42–43 (“[E]ach or ones of the RSs may include signal quality measurement apparatus.”) Reudink’s remote station reports this information in a reverse MBAACH message including a user identifier annotated in blue and a message report annotated in green. *Id.* at 12:29–41, Fig. 13. Reudink teaches “[t]he received direction message of a preferred embodiment may instruct the RS that the identified best carrier, angle and beam is acceptable for communication or, if unavailable, perhaps to look for another BS or RF carrier.” *Id.* at 12:55–59.

Next, Reudink teaches subsequent identification of a preferred antenna beam based on changing conditions including interference, optimizing network capacity and quality, and movement of remote stations. Ex. 1009, at code (57) (“A preferred embodiment control channel is taught which provides for the initial and *subsequent* identification and use of a most preferred antenna beam for establishing communications” (emphasis added)), 2:64–3:9 (“the multiple beam antennas of the BSs of the present invention may provide antenna beams which substantially overlap, such as to allow redundancy and/or to provide the ability for RSs to change to *different channels*, such as based on interference conditions” (emphasis added)), 3:46–59 (describing that Reudink’s system determines which remote stations may operate simultaneously with tolerable co-channel interference and provides desired quality/priority of service). Reudink

describes in more detail algorithms using the same messages discussed with respect to limitations 1a and 1b for *subsequent* identification of preferred antenna beams. *Id.* at 16:2–5, Fig. 5A (describing “an algorithm operable to cause RSs to periodically identify and provide BS antenna beam selection information to the network”), 16:23–26 (describing with respect to the aforementioned algorithm that “[a] preferred embodiment technique *providing identification of a BS antenna beam and/or RS antenna beam according to the present invention is described in detail above with respect to the MBAACH*” (emphasis added)), 16:62–65, Fig. 5B (describing “an algorithm operable to cause BSs to periodically measure signal attributes associated with RSs in communication therewith (or for which communication therewith is possible)”).

Additionally, Reudink teaches tracking and determining a preferred beam for remote stations that change position. For instance, Reudink teaches that its determinations of a preferred antenna beam are made in “time critical” situations, “such as where ones of the RSs are likely to change position and/or where propagation conditions are subject to material change.” Ex. 1009, 11:36–39; *see also id.* at 11:2–3 (describing “initial assignment and *subsequent tracking* of the best serving base station and the most preferred antenna beam associated therewith”) (emphasis added). Consistent with Petitioner’s contentions and Dr. Negus’s testimony, therefore, a person of ordinary skill in the art would understand that Reudink’s determination is whether said associated second device should operatively associate with a *different* beam downlink transmittable. *See Sundance, Inc. v. DeMonte Fabricating Ltd.*, 550 F.3d 1356, 1361 n.3 (Fed. Cir. 2008) (“What a prior art reference discloses or teaches is determined from the perspective of one of ordinary skill in the art.”); *In re Hedges*, 783

F.2d 1038, 1041 (Fed. Cir. 1986) (noting that when evaluating claims for obviousness, “the prior art as a whole must be considered”).

Furthermore, as we noted above in Section II.C.2, we are persuaded by Petitioner’s showing even under Patent Owner’s claim construction. Consistent with Petitioner’s contentions, Patent Owner’s proposed construction reads into claim 1 a preferred embodiment of the ’296 Patent Specification. *See, e.g.*, PO Resp. 9–12 (citing Ex. 1001, 5:55–60, 7:35–39, 8:45–62, 9:12–18, 9:27–30, 9:35–38); PO Sur-Reply 4 (citing Ex. 1001, 10:16–21). Regarding the preferred embodiment, the ’296 Patent Specification describes “determin[ing] if the main beam 116 to which client device 104 is presently associated with is the ‘correct beam’ or the ‘wrong beam’” by considering, for example, “signal parameters (e.g., amplitude, phase, noise level, interfering signals, etc.” and comparing these to a corresponding threshold. Ex. 1001, 7:35–46; *see also id.* at 9:12–18 (describing comparing an RSSI (received signal strength indicator) value to a threshold), 9:35–38 (describing a determination when a better beam’s RSSI exceeds a threshold), 10:16–21 (describing making a determination based on a comparison to a threshold). The ’296 Patent Specification further describes “logic 110 adds an identifier for client device 104 to a temporary blacklist.” *Id.* at 9:27–30; *see also id.* at 10:16–21 (describing that “[c]lient device 104 is then ‘blacklisted’”).

Reudink teaches the ’296 Patent’s preferred embodiment, so even if using Patent Owner’s narrow implied construction, reading that embodiment into the claims, we agree with Petitioner and credit Dr. Negus’s testimony that Reudink teaches limitation 1c. For example, like the ’296 Patent’s “blacklist” (*id.* 9:27–30, 10:16–21), Reudink discloses using its forbidden beam matrix for making changes. Ex. 1009, 18:53–19:15. Reudink, more

specifically, describes “preferably using the algorithms discussed above, the preferred embodiment of the present invention operates to create a *forbidden beam matrix*” preferably “for each BS individually.” *Id.* at 18:4–8 (emphasis added); *see also id.* at 3:60–4:12 (describing using a matrix to provide desired level of quality of service). An example of Reudink’s forbidden beam matrix is reproduced below.

	Beam 1	Beam 2	Beam 3	Beam 4	Beam 5	Beam 6	Beam 7	...
Beam 1	—	X	R					
Beam 2	X	—	X	R				
Beam 3	R	X	—	X	R			
Beam 4		R	X	—	X	X	R	
Beam 5			R	X	—	X		
Beam 6				X	X	—	X	
...								

Id. at 18:11–23. Also like the preferred embodiment of the ’296 Patent, Reudink describes “the preferred embodiment forbidden beam matrix is statistically determined based on the probability of interference considering each RS disposed in the particular antenna beams.” *Id.* at 18:24–30. Reudink also describes that “forbidden beam matrixes may be developed with respect to individual ones of the [remote stations].” *Id.* at 18:30–32.

We agree with Petitioner that Reudink’s base station knows which beam a remote station is using for communication at the time the base station transmits the direction message. Ex. 1009, 19:2–19:6 (describing storing “information regarding particular [remote stations] disposed within particular antenna beams, information regarding position and/or distance of the [remote stations], information regarding the quality of service and/or capacity needs for the [remote stations], and the like”). Reudink describes using its database or matrix (*id.* at 3:62) to optimize capacity “by considering signal quality measurements such as signal to noise ratio (SNR) and/or signal to interference ratio (SIR),” as well as capacity needs for each

cell. *Id.* at 4:1–6. Again, like the preferred embodiment of the '296 Patent, Reudink, more specifically, describes examining base station beam and channel pairings and making assignments based on “signal quality measurement, such as SIR, that just *exceeds a threshold* determined to provide a desired quality of service.” *Id.* at 4:51–46 (emphasis added).

Importantly, Reudink’s disclosures pertain to determining if said associated second device should operatively associate with a *different* beam. For instance, Reudink describes, as a result of the above, “although the use of a particular channel in a particular antenna beam may be prohibited or restricted as discussed above, [a remote station] may *change to another channel* for communications, if desired.” *Id.* at 19:13–15 (emphasis added). Additionally, Reudink’s determination provided to the remote station in the direction message is “that the identified *best carrier, angle and beam is acceptable for communication or, if unavailable, perhaps to look for another BS or RF carrier.*” *Id.* at 12:55–59 (emphasis added).

Reudink also expressly describes identifying a preferred and alternative, different beam. *Id.* at 16:33–34 (describing that “a first and second best antenna beam may be identified”). Reudink describes “a determination may be made as to whether the RS receives energy *above an interference threshold on BS antenna beams other than the strongest BS antenna beam.*” *Id.* at 16:30–33 (emphasis added). The comparison is made “in order to readily identify an alternative communication link in case of communication anomaly or in order to select optimized resource utilization solutions.” *Id.* at 16:34–36.

We agree with Petitioner’s contentions and we credit and give significant weight to the testimony of Dr. Negus (Ex. 1006) over Dr. Short (Ex. 2002; Ex. 2004) because Petitioner’s arguments and Dr. Negus’s

testimony are consistent with evidence of record, including Reudink's teachings. We further note that in contrast of the testimony of Dr. Negus, Dr. Short's testimony is conclusory because he does not provide persuasive explanation or citation to the evidentiary record. Ex. 2002; Ex. 2004.

"Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight." 37

C.F.R. § 42.65 (2019). Dr. Short's testimony additionally does not take into account the full teachings of Reudink set forth above. Also, Dr. Short's testimony is based on Patent Owner's overly narrow implied claim construction, which we decline to adopt (*see supra* § II.C.2). We, therefore, determine that Patent Owner's arguments and evidence do not undermine Petitioner's showing.

We next consider whether the first device bases its determination on the "information from at least one uplink transmission." Ex. 1001, 10:63–11:2. We again are persuaded by Petitioner's contentions and we credit and give significant weight to the testimony of Dr. Negus because both are consistent with the evidence of record, including Reudink's description reproduced in the testimony of Dr. Negus. As discussed with respect to the first and second recitations in claim 1, Reudink describes the messaging illustrated in Figure 13, transmitted from the remote station to the base station (Ex. 1009, 12:33–38), and the messaging illustrated in Figure 14, instructing the remote station whether the identified signal is acceptable (*id.* at 12:52–59). Additionally, Reudink discloses:

Hybrid systems, wherein both adaptive arrays and fixed beam arrays are used, may be utilized according to the present invention. For example, a preferred embodiment of the present invention utilizes an adaptive array (or feed network coupled to a common antenna array) on the uplink and a fixed beam array

(or feed network coupled to the common antenna array) on the downlink. Accordingly, *selection of a downlink antenna beam to use may be made from the uplink signals* to provide a system which adapts on a per user basis for the uplink and selects one of N fixed beams for downlink transmission.

Id. at 7:17–27 (emphasis added).

For the reasons given, we determine that Petitioner’s arguments and evidence demonstrate that Reudink discloses and at least teaches the third recitation in claim 1 (i.e., 1c). As a further, independent, reason below we discuss Petitioner’s contentions regarding the knowledge of the skilled artisan. *See infra* § II.D.3.b. We determine that Patent Owner’s arguments and evidence do not undermine Petitioner’s showing for the reasons given here and below in Section II.D.3.b.

v. *Limitation 1d*

The fourth recitation in claim 1, referred to by Petitioner as “1d” (Pet. 39) is reproduced below.

if said associated second device should operatively associate with a different beam, then configuring said first device to allow said second device to operatively associate with said different beam by at least one of configuring said first device to identify that said second device is allowed to operatively associate with said different beam, or configuring said first device to identify that said second device is not allowed to operatively associate with said beam.

Ex. 1001, 11:3–11.

For the fourth recitation, Petitioner points to the combined teachings of Reudink and Antonio, as well as the knowledge of one having ordinary skill in the art. Pet. 39–46 (citing, *e.g.*, Ex. 1009, at code (57), 11:1–4, 11:18–22, 12:52–61, 12:65–13:9, Fig. 14; Ex. 1010, 3:13–39, 3:47–55,

8:49–67, 9:11–13, 9:57–59, 10:16–18, 10:65–11:2, 13:9–21, 13:30–41, Figs. 5A, 5B; Ex. 1006 ¶¶ 356, 360–362, 373, 377–380, 383–389, 391, 407). In particular, relying on the testimony of Dr. Negus, Petitioner contends Antonio discloses a method of transmitting control messages from a base station to a user that is similar and complimentary to that disclosed in Reudink and that a person having ordinary skill in the art would have been motivated to include Antonio’s add and drop beam sets in Reudink’s system. *See, e.g., id.* at 21–24, 41–44 (citing, *e.g.*, Ex. 1010, 3:13–39, 3:47–55, 8:49–67, 9:11–13, 9:57–59, 10:16–18, 10:65–11:2, 13:9–21, 13:30–41, Figs. 5A, 5B; Ex. 1006 ¶¶ 377–380, 383–389, 391, 395–401, 405–407). Dr. Negus, for example, testifies that Reudink and Antonio are directed to the same problem and contain analogous disclosures (Ex. 1006 ¶¶ 395–401) and that a person having ordinary skill in the art would have known of the advantages of the proposed modification (*see, e.g., id.* at ¶ 407).

We discuss here Petitioner’s aforementioned contentions and evidence showing that the asserted art teaches limitation 1d and we discuss below (*see* § II.D.3.b) Petitioner’s reasoning to combine. Regarding limitation 1d, we are persuaded by Petitioner’s contentions and we credit and give significant weight to the testimony of Dr. Negus because both are consistent with the evidence of record. For instance, consistent with Petitioner’s contentions and Dr. Negus’s testimony (Pet. 40; Ex. 1006 ¶ 360), Reudink describes a “difficulty” in using multiple beam antennas is “subsequent tracking of the best serving base station and the most preferred antenna beam.” Ex. 1009, 11:1–4.

Although Reudink provides the solution discussed above with respect to limitations 1a through 1c, also consistent with Petitioner’s contentions and Dr. Negus’s testimony (*see, e.g.,* Pet. 19, 23–24; Ex. 1006 ¶¶ 221, 405–407),

Antonio describes “the inventors have designed a beam handoff procedure for choosing the most desirable beam(s) for a user terminal to receive traffic on given that the position of the user terminal is not known and given the possibility of beam blockage.” Ex. 1010, 8:24–37. Antonio describes the start of its beam handoff procedure as follows: “the gateway transmits a Beam Mask Message (BMM) to the user terminal over the established communication link(s),” which “contains a list of beam identifiers . . . over which the gateway can transmit data or information.” Ex. 1010, 8:56–60. According to Antonio, “[t]he user terminal measures the beam strength of each beam identified in the most recent BMM received from the gateway” and transmits a “Pilot Strength Measurement Message (PSMM) to the gateway,” which “contains one or more beam identifiers from BMM 600 and corresponding beam strength values.” *Id.* at 9:11–13, 9:57–59, 10:16–18. Consistent with Petitioner’s contentions and Dr. Negus’s testimony, Antonio’s handoff procedure is similar to Reudink’s procedure.

Furthermore, Antonio describes “[a]fter receiving a PSMM from the user terminal, the gateway determines a new *active beam set*,” which is “*the set of beams that should be used* as communication links between the gateway and the user terminal.” Ex. 1010, 10:65–11:2 (emphasis added). Regarding the add beam set and drop beam set that Petitioner asserts would have been included in Reudink’s message by a person having ordinary skill in the art, Antonio discloses further details as follows:

[T]he gateway starts transmitting traffic on the beams in the new active beam set that are not in the current active beam set if there are any such beams (step 516). In the next step, the gateway sends a handoff direction message (HDM) to the user terminal (step 518). In one embodiment, the HDM can contain two sets of beam identifiers, an[] add beam set and a drop beam set. The add beam set contains a beam identifier for each beam

within the new active beam set that is not in the current active beam set. It is possible for the add beam set to be empty, in which case the HDM will only contain the drop beam set. The drop beam set contains a beam identifier for each beam in the current active beam set that is not in the new active beam set.

Id. at 13:9–21.

We find that Reudink’s and Antonio’s disclosures summarized above teach “configuring said first device to identify that said second device is *allowed* to operatively associate with said different beam,” or “to identify that said second device is *not allowed* to operatively associate with said beam” (Ex. 1001, 11:7–11 (emphases added)), as well as the remainder of limitation 1d. Accordingly, we determine that Petitioner’s arguments and evidence demonstrate that the asserted art teaches the fourth recitation in claim 1, i.e., 1d.

b. Reasoning to Combine Reudink and Antonio

Turning to Petitioner’s reasoning to combine Reudink and Antonio, we find that Petitioner articulates reasons that a skilled artisan would have been motivated to combine the teachings in the manner recited in claim 1; and that Patent Owner’s arguments and evidence do not undermine Petitioner’s showing.

We turn to the parties’ contentions regarding limitation 1c. For the reasons given (*see supra* § II.D.3.a.iv), we determine that Petitioner’s arguments and evidence demonstrate that Reudink discloses the third recitation in claim 1 (i.e., 1c). As a further, independent reason, however, we now discuss limitation 1c and the parties’ contentions regarding obviousness over Reudink and the knowledge of the skilled artisan.

Petitioner contends as follows:

To the extent that the Board finds that Reudink does not contain sufficient explicit disclosure, Reudink nevertheless renders this limitation as obvious. Reudink's procedures for determining a preferred antenna beam identify these beams based on criteria such as signal strength, signal to noise ratio, or signal to interference ratio, or signal attribute information such as a signal being above a threshold, and where the base station can identify multiple candidate antenna beams. Ex. 1006 ¶ 349. The base station is also aware of the current beam for a given remote station. Ex. 1006 ¶ 350. A POSITA would understand a base station that is in possession of a remote station's preferred beam and its current beam would be able to determine if the preferred beam is the same as the current beam, and that if the preferred beam is not the current beam, that the base station may determine that the remote station should switch to the preferred beam. Ex. 1006 ¶ 351. A POSITA would find that it would be obvious to try adding such functionality to a base station in view of what Reudink discloses as Reudink provides all information necessary for such a determination, and this modification would be the result of routine steps and would yield predictable results. Ex. 1006 ¶ 351.

Pet. 38–39.

Dr. Negus testifies that in Reudink “the BS identifies each candidate beam by a ‘beam number’ (see, for example, ¶¶ 269, 291, 293 and 333 above).” Ex. 1006 ¶ 349. Dr. Negus also testifies that the base station also is in possession of the “current antenna beam number.” *Id.* ¶ 171, 350. Dr. Negus further testifies as follows:

Third, a POSITA would understand that a BS in possession of the “beam number” for the “preferred antenna beam” as well as the “current antenna beam number” can readily make an affirmative determination as to whether or not such “preferred antenna beam” is the “same” or “different” relative to the “current antenna beam”, and then if “different” also identify such a “different beam” via the “beam number” for the “preferred antenna beam”. In my opinion, a POSITA would find this to be obvious to try in view of the disclosures of

Reudink since Reudink provides all of the necessary information and the result of trying this obvious modification is both entirely predictable and likely to be considered as part of any routine optimization of the system of Reudink.

Id. ¶ 351.

Patent Owner asserts “the Petition alleges obviousness without providing any motivation to modify Reudink in any way” and “without demonstrating that the modification would have been predictable or routine.” PO Resp. 2; *see also id.* at 22–24 (asserting that “the Petition provides ***no reason why*** a POSA would have undertaken any such steps”). Patent Owner acknowledges that Reudink teaches determining the beam to which the remote station should be assigned. PO Resp. 15. Even considering only Reudink’s disclosures in that regard, we agree with Petitioner that a person having ordinary skill in the art would have modified Reudink to make an affirmative determination as to whether the preferred antenna beam is the same or different than the current beam to optimize Reudink’s system. Pet. 35, 38–39; Ex. 1006 ¶ 351.

We are persuaded by Petitioner’s contentions and we credit Dr. Negus’s testimony because they are consistent with the evidence of record. Reudink describes that “[t]he current antenna beam information provides the current antenna beam number and pointing angle.” Ex. 1009, 11:55–67. Reudink also describes that the “preferred embodiment direction message includes synch bits, RS identification information, BS identification information, carrier number, antenna beam number, timing advance information, and end bits” and “[t]he beam number identifies the beam to which the direction message relates.” *Id.* at 12:61–13:5. Petitioner’s contentions and Dr. Negus’s testimony that the skilled artisan would have selected making the determination whether the preferred beam is different

than the current beam from the two options (i.e., making the determination and not making the determination) to optimize Reudink's system is consistent with Reudink's disclosure, for example, of determining resource utilization sequences and combinations "to provide *optimal* capacity, desired quality/priority of service, and/or like considerations." *Id.* at 3:54–59 (emphasis added); *see also id.* at 4:1–12 (describing that "[t]he capacity of a particular cell is *optimized*" by analyzing "various resource utilization solutions" with reference to a "database" (emphasis added)).

Accordingly, as an independent, additional reason to our reasons given above (*see supra* § II.D.3.a.iv), we determine that Petitioner demonstrates that limitation 1c would have been obvious over Reudink and the knowledge of one having ordinary skill in the art. We also determine that Patent Owner's arguments and evidence do not undermine Petitioner's showing.

We next turn to the parties' contentions regarding limitation 1d and reasoning to modify Reudink to include Antonio's technique. Relying on the testimony of Dr. Negus, Petitioner contends that a person having ordinary skill in the art would have modified Reudink's message to include Antonio's add and drop beam sets to enhance performance with "mobile" remote stations and making such a modification would have presented minimal difficulty. *See, e.g.*, Pet. 21–24, 41–44 (citing, *e.g.*, Ex. 1006 ¶¶ 377–380, 383–389, 391, 395–401, 405–407). Dr. Negus testifies that a person having ordinary skill in the art would have known that the proposed modification had distinct advantages to overall network efficiency and user experience, would have significantly reduced signaling load, and would have been desirable for a mobile system. Ex. 1006 ¶ 407 (cited at Pet. 22, 24, 46); *see also id.* ¶ 405 (testifying that implementing

Antonio's technique in Reudink would have been routine optimization for a person having ordinary skill in the art) (cited at Pet. 24).

We are persuaded by Petitioner's contentions and we credit and give significant weight to the testimony of Dr. Negus because both are consistent with the evidence of record including the teachings of Reudink and Antonio. For instance, consistent with Petitioner's contentions and Dr. Negus's testimony (Pet. 40; Ex. 1006 ¶ 360), Reudink describes a "difficulty" in using multiple beam antennas is "subsequent tracking of the best serving base station and the most preferred antenna beam." Ex. 1009, 11:1–4. Antonio describes "the inventors have designed a beam handoff procedure for choosing the most desirable beam(s) for a user terminal to receive traffic on given that the position of the user terminal is not known and given the possibility of beam blockage." Ex. 1010, 8:24–37. Antonio describes that its technique "will decrease the call dropping rates and provide a desired level of beam source diversity." *Id.* at code (57); *see also id.* at 8:38–40 (describing that Antonio's procedure "is aimed at reducing hand off rates and call dropping rates while maintaining a desired level of beam source diversity"). The results are realized, for example, by Antonio's procedure identifying a set of beams that should be used as communication links that may contain *multiple beam identifiers*. *Id.* at 9:11–14 (describing measuring "beam strength of *each beam identified*" (emphasis added)), 10:16–18 (describing transmitting "one or *more* beam identifiers . . . and corresponding beam strength values" (emphasis added)), 10:65–11:2 (describing identifying "a new active beam set" (emphasis added)), 13:12–15 (describing a handoff direction message that "can contain *two sets of beam identifiers*, an[] add beam set and a drop beam set" (emphasis added)).

Patent Owner does not dispute Petitioner's contentions regarding reasoning to modify Reudink to include Antonio's add and drop beam sets. *See generally* PO Resp.¹² For the reasons given, we determine that Petitioner has articulated reasoning with rational underpinning to support that a person having ordinary skill in the art would have had motivation to and been able to modify Reudink to include Antonio's add beam set and drop beam set.

In summary, for the reasons given, we determine that Petitioner has articulated reasoning with rational underpinning to support the conclusion that one having ordinary skill would have had reason to combine the teachings in the manner advanced by Petitioner. We further determine that Petitioner's showing is not undermined by Patent Owner's arguments and evidence.

¹² In support of the Patent Owner Preliminary Response, Dr. Short testifies that Petitioner proposes to add information to Reudink's direction message without considering "whether the net of the modification would in face 'reduce signaling load' on the network." *See* Ex. 2002 ¶¶ 89–92. Patent Owner no longer advances arguments relying on that testimony. *See generally* PO Resp.; Paper 13, 5 ("Patent Owner is cautioned that any arguments for patentability not raised in the response may be deemed waived.") Furthermore, we give little to no weight to Dr. Short's testimony (Ex. 2002 ¶¶ 89–92) because he does not take into account the benefits of Antonio's technique when mobile remote stations need to change beams quickly. *See, e.g.*, Ex. 1010, 8:24–40 (describing desirability of technique "given that the position of the user terminal is not known and given the possibility of beam blockage").

c. Conclusion—Claim 1

For the reasons given, on this record, we determine that Petitioner has demonstrated by a preponderance of the evidence that claim 1 is unpatentable, under 35 U.S.C. § 103(a), over Reudink and Antonio.

4. Discussion of Independent Claims 17 and 33

Independent claims 17 and 33 are similar to claim 1. Petitioner's showing with respect to claims 17 and 33 is similar to its showing with respect to claim 1 and, indeed, Petitioner references its contentions for claim 1. Pet. 59–61, 65–70. Petitioner accounts for all differences in the claims. For instance, with respect to the recitation of “[a] computer-readable medium having computer executable instructions” in claim 17 and “logic operatively coupled to said transceiver” in claim 33, Petitioner points to teachings in Reudink and Antonio and testimony of Dr. Negus. *Id.* (citing *e.g.*, Ex. 1009, 8:25–34; Ex. 1006 ¶¶ 550, 551, 556, 670–672). Reudink, for example, discloses:

Control of switch matrix 202 and/or radio 201 is preferably provided by a processor based control system (BS controller 203), preferably having a central processing unit, memory, and a control algorithm operable therewith. It should be appreciated that BS controller 203 may be adapted to provide additional functionality such as digital signal processing (DSP), interference canceling, signal quality analysis, and the like.

Ex. 1009, 8:25–34.

Patent Owner does not argue these claims separately. *See generally* PO Resp. We agree with Petitioner's contentions and we credit and give significant weight to the testimony of Dr. Negus because both are consistent with the evidence of record, including Reudink's and Antonio's teachings.

Accordingly, on this record, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 17 and 33 are unpatentable, under 35 U.S.C. § 103(a), over Reudink and Antonio.

5. *Discussion of Dependent Claims 2 and 18*

Each of claims 2 and 18 recites “wherein said first device includes an access point device and said second device includes a client device.”

Ex. 1001, 11:12–14, 13:43–45. With respect to the term “access point device” recited in the claims, for the reasons given *supra* in Section II.C.1, we agree that “access point” as used in the ’296 Patent includes a base station. Relying on the testimony of Dr. Negus, Petitioner points to Reudink’s base stations. Pet. 46–47, 61–62 (citing Ex. 1009, 1:14–39, 2:41–53, 14:7–15; Ex. 1006 ¶¶ 412, 413, 415, 419, 581).

Reudink discloses:

The preferred embodiment of the present invention utilizes a network of BSs deployed in a configuration to provide coverage to the RSs for which it is desired to provide wireless data communication services. For example, the network of BSs could include a deployment of BSs dense enough to assure coverage to a plurality of RSs throughout a particular geographic area.

The deployment of BSs to provide wireless data communication services in a defined geographic service area associated with each particular BS shall be referred to herein as having “cells” associated with each BS, wherein RSs disposed within the geographic boundaries of a cell communicate principally with the BS thereof.

Ex. 1009, 2:41–53; *see also id.* at 14:7–15 (describing that BSs 401 and 403 are deployed to provide communication services within cells 402 and 404, respectively).

Patent Owner does not argue dependent claims 2 and 18 separately. *See generally* PO Resp. We agree with Petitioner's contentions and we credit and give significant weight to the testimony of Dr. Negus because both are consistent with the evidence of record, including Reudink's teachings above. Accordingly, on this record, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 2 and 18 are unpatentable, under 35 U.S.C. § 103(a), over Reudink and Antonio.

6. *Discussion of Dependent Claims 4, 20, and 35*

We turn to Petitioner's contentions that dependent claims 4, 20, and 35 are unpatentable as obvious over Reudink and Antonio. Each of claims 4, 20, and 35 depends from claim 1, 17, or 33, respectively. Each of claims 4 and 20 recites:

wherein configuring said first device to determine information from at least one uplink transmission receivable from said second device through said smart antenna further includes:

configuring said first device to be capable of receiving at least one uplink transmittable message through said smart antenna;

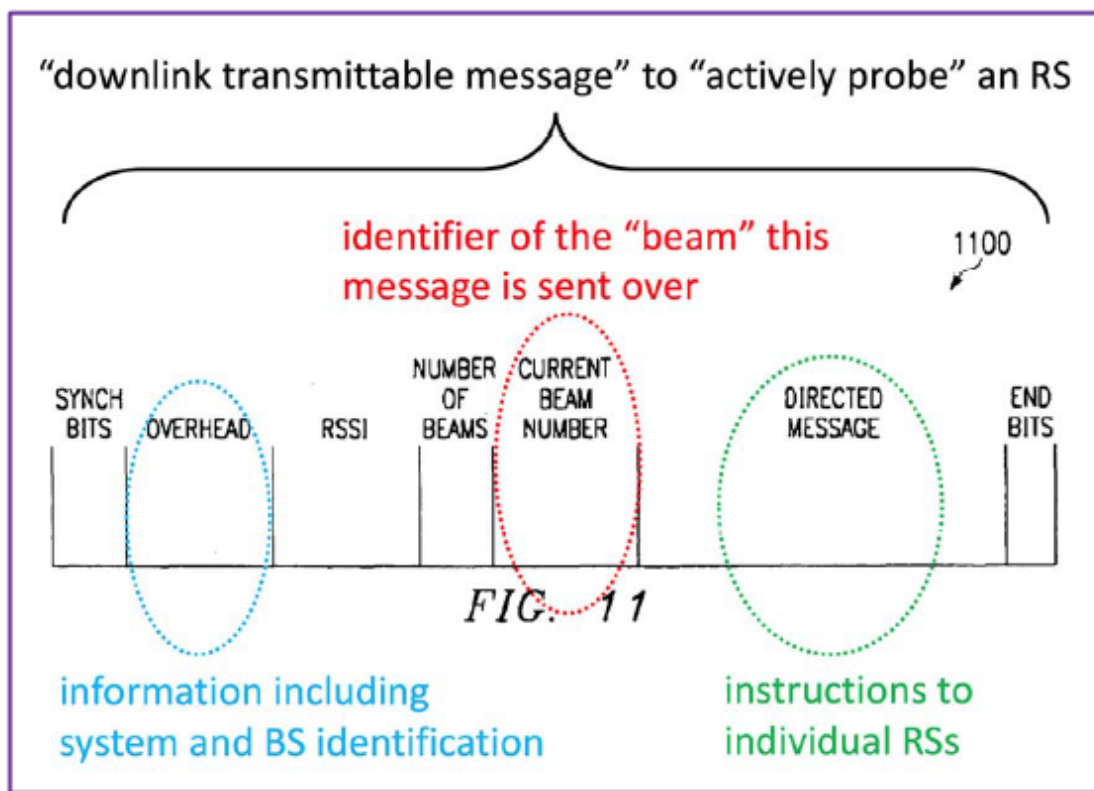
configuring said first device to actively probe said second device by outputting a signal suitable for causing said smart antenna to transmit at least one downlink transmittable message over at least said different beam; and

configuring said first device to gather signal parameter information from said least one uplink transmittable message.

Ex. 1001, 11:26–40, 13:59–14:5. These limitations are commensurately recited in claim 35. Ex. 1001, 16:1–10.

For claim 4, relying on the testimony of Dr. Negus, Petitioner points to Reudink's teachings relating to those discussed with respect to

independent claim 1 (*see supra* § II.D.3), as well as further teachings in Reudink relating to forward link messages that provide instructions to actively probe remote stations. Pet. 47–54 (citing *e.g.*, Ex. 1009, 11:44–67, 12:1–18, 12:24–32, Figs. 5A, 11, 12; Ex. 1006 ¶¶ 424, 425, 427–434, 436–440, 446–451, 454, 458–460, 462, 463, 465, 466, 471). Relying on the testimony of Dr. Negus, the Petition includes an annotated Figure 11 of Reudink, which is reproduced below. *Id.* at 51; Ex. 1006 ¶ 446.



Petitioner’s annotated Figure 11 of Reudink above depicts a data container for a forward link access channel (Ex. 1009, 6:35–36, 11:49–51) and includes a blue annotation encircling “OVERHEAD” noting those bits comprise information including system and BS identification, a red annotation encircling “CURRENT BEAM NUMBER” noting those bits comprise an identifier of the “beam” this message is sent over, and a green

annotation encircling “DIRECTED MESSAGE” noting those bits comprise instructions to individual RSs. Pet. 51; Ex. 1006 ¶ 446.

Consistent with Petitioner’s contentions and Dr. Negus’s testimony, Reudink’s forward message includes the base station identity, RSSI information to allow for quick determination of signal strength, the number of antenna beams associated with the carrier and the pointing angle of the beams, information regarding the current beam number and pointing angle, as well as the directed message, which provides instructions to individual remote stations. Ex. 1009, 11:51–67.

Also consistent with Petitioner’s contentions and Dr. Negus’s testimony, Reudink discloses:

In operation according to a preferred embodiment, a BS is aligned with antenna beam 1 facing north, antenna beam 2 facing north easterly, etcetera as illustrated in FIG. 1. Preferably, for the MBAACH, slot 1 corresponds to the MBA pointed in direction 1, in the next repetition of the MBAACH slot, the MBA would point in direction 2, etcetera. The progression of the MBAACH slots according to this embodiment of the present invention is shown in FIG. 12.

According to the preferred embodiment, the RS listens for the synch burst and attempts to measure the signal strength. *Id.* at 12:6–15, Fig. 12. Additionally, consistent with Petitioner’s contentions and Dr. Negus’s testimony regarding triggering events, Reudink describes “an algorithm operable to cause RSs to periodically identify and provide BS antenna beam selection information to the network.” *Id.* at 16:3–5, Fig. 5A.

For claims 20 and 35, the Petition references back to claim 4. Pet. 62–63, 70. Patent Owner does not argue dependent claims 4, 20, and 35 separately. *See generally* PO Resp. We agree with Petitioner’s contentions and we credit and give significant weight to the testimony of Dr. Negus

because both are consistent with the evidence of record, including Reudink's teachings above. Accordingly, on this record, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 4, 20, and 35 are unpatentable, under 35 U.S.C. § 103(a), over Reudink and Antonio.

7. *Discussion of Dependent Claims 5, 21, and 36*

We turn to Petitioner's contentions that dependent claims 5, 21, and 36 are unpatentable, under 35 U.S.C. § 103(a), as obvious over Reudink and Antonio. Each of claims 5, 21, and 36 depends from claim 4, 20, or 35 respectively. Each of claims 5 and 21 further recites:

wherein configuring said first device to determine information from at least one uplink transmission receivable from said second device through said smart antenna further includes:

configuring said first device to be capable of receiving a plurality of uplink transmittable messages through said smart antenna;

configuring said first device to actively probe said second device by outputting a signal suitable for causing said smart antenna to transmit at least one downlink transmittable message separately over each of a group of beams comprising said beam and said different beam; and

configuring said first device to gather signal parameter information from each of said plurality of uplink transmittable messages.

Ex. 1001, 11:41–56, 14:6–22. These limitations are commensurately recited in claim 36. Ex. 1001, 16:11–21.

For these limitations, Petitioner points to the same teachings in Reudink discussed *supra* in Sections II.D.3 and II.D.6 with respect to independent claim 1 and dependent claims 4, 20, and 35. Pet. 54–56, 63–64, 70–71 (citing *e.g.*, Ex. 1006 ¶¶ 477, 482, 486–488, 603, 608, 613, 724, 730). Petitioner accounts for the differences in the claims including, for example,

that the first device is configured to receive a *plurality* of uplink transmittal messages, rather than at least one message, and smart antenna transmission is over a group of beams comprising *said beam* and said different beam.

Ex. 1001, 11:41–56, 14:6–22, 16:11–21. For instance, Petitioner relies on Dr. Negus’s testimony that Reudink discloses a plurality of MBAACH messages sent periodically. Ex. 1006 ¶¶ 477, 487. Additionally, Dr. Negus testifies that a respective forward link MBAACH message is sent separately over each respective one of all antenna beams. Ex. 1006 ¶ 482. Consistent with Petitioner’s contentions and Dr. Negus’s testimony, Reudink describes that its algorithm causes remote stations “to periodically” provide the information to the network. Ex. 1009. 16:3–5, Fig. 5A. Also consistent with Petitioner’s contentions and Dr. Negus’s testimony, Reudink describes that the remote station “preferabl[y] logs the carrier *numbers* and the beam *numbers* that produce a strongest receive signal strength, for example a *first and second* most preferred carrier and beam combination may be determined.” *Id.* at 12:24–37 (emphases added).

Patent Owner does not argue dependent claims 5, 21, and 36 separately. *See generally* PO Resp. We agree with Petitioner’s contentions and we credit and give significant weight to the testimony of Dr. Negus because both are consistent with the evidence of record, including Reudink’s teachings above. Accordingly, on this record, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 5, 21, and 36 are unpatentable, under 35 U.S.C. § 103(a), over Reudink and Antonio.

8. *Discussion of Dependent Claims 6, 22, and 37*

We turn to Petitioner’s contentions regarding dependent claims 6, 22, and 37. Each of claims 6, 22, and 37 depends from claim 1, 17, or 33,

respectively. Additionally, each of claims 6, 22, and 37 recites “[determining or determine] information about a current position of said second device relative to said smart antenna.” Ex. 1001, 11:61–63, 14:29–31, 16:25–26. Relying on the testimony of Dr. Negus, Petitioner points to Reudink’s teachings relating to the reverse MBAACH message and creating the forbidden beam matrix. Pet. 56–58 (citing *e.g.*, Ex. 1009, 12:24–37, 12:39–61, 16:52–58, 16:62–67, 17:12–17, 17:30–43, 18:4–32, 18:62–19:10, Fig. 5B; Ex. 1006 ¶¶ 504–506, 513–518, 520).

Consistent with Petitioner’s contentions and the testimony of Dr. Negus, Reudink, for example, describes:

It should be appreciated that information in addition to the above shown forbidden simultaneous antenna beam information may be utilized according to the present invention. For example, information may be associated with each antenna beam, either within the above shown forbidden antenna beam table or external thereto, which provides network communication information of interest. Specifically, *information regarding particular RSs disposed within particular antenna beams, information regarding position and/or distance of the RSs*, information regarding the quality of service and/or capacity needs for the RSs, and the like may be stored and/or utilized according to the present invention. This information may be provided by an operator or other source, such as upon initial deployment or thereafter, determined through system operation, and/or be compiled as historical information.

Ex. 1009, 18:62–19:10 (emphasis added); *see also id.* at 16:52–58 (describing logging RS signal attributes so as to determine likely interference levels), 18:35–37 (describing interference when a remote station is relatively far from the base station).

Patent Owner does not argue dependent claims 6, 22, and 37 separately. *See generally* PO Resp. We agree with Petitioner’s contentions

and we credit and give significant weight to the testimony of Dr. Negus because both are consistent with the evidence of record, including Reudink's teachings above. Accordingly, on this record, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 6, 22, and 37 are unpatentable, under 35 U.S.C. § 103(a), over Reudink and Antonio.

9. *Discussion of Dependent Claims 7, 23, and 38*

We turn to Petitioner's contentions regarding dependent claims 7, 23, and 38. Each of claims 7, 23, and 38 depends from claim 1, 17, or 33, respectively. Each of claims 7, 23, and 38 recites "[comparing/compare] said determined information to corresponding beam association threshold information." Ex. 1001, 12:3–5, 14:38–40, 16:29–30. Relying on the testimony of Dr. Negus, Petitioner points to the same teachings discussed above with respect to independent claim 1 (*see supra* § II.D.3) including, more specifically, Reudink's teachings of signal quality measurements using a threshold. Pet. 58–59, 64, 71 (citing *e.g.*, Ex. 1009, 4:51–56, 15:11–20; Ex. 1006 ¶¶ 529, 530, 546). Consistent with Petitioner's contentions and Dr. Negus's testimony, Reudink discloses "[p]referably, all BS, beam, channel pairings are examined and assignments with respect to simultaneous usage are made to those pairs that provide a signal quality measurement, such as SIR, that just exceeds *a threshold* determined to provide a desired quality of service." Ex. 1009, 4:51–56 (emphasis added).

Patent Owner does not argue dependent claims 7, 23, and 38 separately. *See generally* PO Resp. We agree with Petitioner's contentions and we credit and give significant weight to the testimony of Dr. Negus because both are consistent with the evidence of record, including Reudink's teachings above. Accordingly, on this record, we determine that Petitioner

has demonstrated by a preponderance of the evidence that claims 7, 23, and 38 are unpatentable, under 35 U.S.C. § 103(a), over Reudink and Antonio.

E. Patent Owner's Motion to Amend

We have concluded that the challenged claims of the '296 Patent are unpatentable. Therefore, we address Patent Owner's contingent motion to enter proposed substitute claims 49–65. Mot. to Amend 1–3. For the reasons that follow, Patent Owner's motion is *denied*.

In reviewing a motion to amend, we consider whether the motion meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) (2012) and 37 C.F.R. § 42.121 (2019). *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 (PTAB Feb. 25, 2019) (precedential) (“*Lectrosonics*”). That is, the patent owner must demonstrate the following: (1) the amendment responds to a ground of unpatentability involved in the trial; (2) the amendment does not seek to enlarge the scope of the claims of the patent or introduce new subject matter; (3) the amendment proposes a reasonable number of substitute claims; and (4) the proposed claims are supported in the original disclosure of the patent. *See* 35 U.S.C. § 316(d) (2012); 37 C.F.R. § 42.121 (2019); *see also Lectrosonics* at 4–8.

We also consider unpatentability. In that regard, the patent owner “does not bear the burden of persuasion to demonstrate the patentability of [the proposed] substitute claims.” *Lectrosonics* at 4 (citing *Aqua Prods., Inc. v. Matal*, 872 F.3d 1290 (Fed. Cir. 2017); *Bosch Auto. Serv. Sols. LLC v. Iancu*, 878 F.3d 1027 (Fed. Cir. 2017)). “Rather, as a result of the current state of the law and [U.S. Patent and Trademark Office] rules and guidance, the burden of persuasion will ordinarily lie with the petitioner to show that

any proposed substitute claims are unpatentable by a preponderance of the evidence.” *Lectrosonics* at 4.

For the reasons explained below, we conclude that Patent Owner’s Motion to Amend does not satisfy the requirements of 37 C.F.R.

§ 42.121(b)(1) because it does not set forth written description support for any proposed substitute independent claim. We also determine that Petitioner has established by a preponderance of the evidence that the proposed substitute claims would have been obvious.

1. Proposed Substitute Claims

Proposed substitute independent claims 49, 55, and 61 are set forth below, with additions shown in underlining.

49. (Substitute for claim 1, if found unpatentable) A method for use in a wireless communication system compliant with IEEE 802.11 standards, the method comprising:

configuring a first device compliant with IEEE 802.11 standards having an adaptive smart antenna to selectively allow a second device compliant with IEEE 802.11 standards to operatively associate with a beam downlink transmittable to said second device using said adaptive smart antenna;

configuring said first device to determine information from at least one uplink transmission receivable from said second device through said adaptive smart antenna, wherein said information comprises at least one of a distance parameter or an angular parameter;

configuring said first device to determine if said associated second device should operatively associate with a different beam downlink transmittable using said adaptive smart antenna

based on said determined information, such that the first device is configured to consider interfering signals in the determination; and

if said associated second device should operatively associate with a different beam, then configuring said first device to allow said second device to operatively associate with said different beam by at least one of configuring said first device to identify that said second device is allowed to operatively associate with said different beam, or configuring said first device to identify that said second device is not allowed to operatively associate with said beam.

Mot. to Amend i–ii.

55. (Substitute for claim 17, if found unpatentable) A computer-readable medium having computer executable instructions for causing to perform acts comprising:

configuring a first device compliant with IEEE 802.11 standards having an adaptive smart antenna to selectively allow a second device compliant with 802.11 standards to operatively associate with a beam downlink transmittable to said second device using said adaptive smart antenna;

configuring said first device to determine information from at least one uplink transmission receivable from said second device through said adaptive smart antenna, wherein said information comprises at least one of a distance parameter or an angular parameter;

configuring said first device to determine if said associated second device should operatively associate with a different beam downlink transmittable using said adaptive smart antenna based on said determined information; and

if said associated second device should operatively associate with a different beam, then configuring said first device to allow said second device to operatively associate with said different beam by at least one of configuring said first device to identify that said second device is allowed to operatively associate with said different beam, or configuring said first device to identify that said second device is not allowed to operatively associate with said beam.

Id. at v.

61. (Substitute for claim 33, if found unpatentable) An apparatus for use in a wireless communication system compliant with 802.11 standards, the apparatus comprising:

at least one adaptive smart antenna;

at least one transceiver operatively coupled to said adaptive smart antenna and configured to send and receive electromagnetic signals using said adaptive smart antenna; and

logic operatively coupled to said transceiver and configured to selectively allow a second device compliant with 802.11 standards to operatively associate with a beam downlink transmittable to said second device using said adaptive smart antenna, determine information from at least one uplink transmission receivable from said second device through said adaptive smart antenna wherein said information comprises at least one of a distance parameter or an angular parameter, determine if said associated second device should operatively associate with a different beam downlink transmittable using said adaptive smart antenna based on said determined information, and if said associated second device should operatively associate with a different beam then allow said second device

to operatively associate with said different beam and selectively identify that said second device is not allowed to operatively associate with said beam.

Id. at viii–ix.

2. *Discussion—Written Description*

An amendment may not enlarge the scope of the claims of the patent or introduce new matter. 35 U.S.C. § 316(d)(3) (2012). In connection with its motion to amend, a patent owner must set forth “support in the original disclosure of the patent for each claim that is added or amended.” 37 C.F.R. § 42.121(b)(1) (2019). We first address whether Patent Owner’s Motion to Amend sets forth how the original application provides written description support for the amended claims. The test for determining compliance with the written description requirement is whether the disclosure of the application as originally filed reasonably conveys to a person of ordinary skill in the art that the inventor had possession at the time of filing of the claimed subject matter, rather than the presence or absence of literal support in the specification for the claim language. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc); *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563 (Fed. Cir. 1991); *In re Kaslow*, 707 F.2d 1366, 1375 (Fed. Cir. 1983).

As an initial matter, Patent Owner relies on the ’296 Patent Specification, rather than any application, in its assertion that written description support is provided for the recitations in the proposed substitute claims. Mot. to Amend 4–19.¹³ Dr. Short’s testimony also relies on the

¹³ Patent Owner also cites “Ex. 2003 (‘Short Decl.’).” *Id.* at 5. Exhibit 2003, however, is the Declaration of James. A. Milkey in support of his

'296 Patent Specification, not an application. Ex. 2004 ¶¶ 26–84. Petitioner asserts Patent Owner's Motion to Amend should be denied because "[t]he Motion neither cites, nor provides, the original disclosure as filed." MTA Opp. 1, 4–5. Patent Owner responds that "[t]he patent's specification is identical to the original application, and was not amended in any way during prosecution" so Patent Owner satisfied § 42.121(b). MTA Reply 2.

"A motion to amend claims" must "set forth" "[t]he support in the original disclosure of the patent for each claim that is added or amended." 37 C.F.R. § 42.121(b) (2019). "Importantly, to meet this requirement, citation should be made to the original disclosure of the application, as filed, rather than to the patent as issued." *Lectrosonics* at 8. Based on the record before us, we agree with Petitioner that Patent Owner has not set forth the written description support in the original disclosure of the patent for the proposed substitute claims. We need not consider Petitioner's arguments further in this regard because even after consideration of the '296 Patent Specification, we determine that that disclosure does not provide written description support for the proposed substitute claims.

We turn to "a wireless communication system compliant with IEEE 802.11 standards" recited in the preambles of proposed substitute claims 49 and 61. Mot. to Amend i, viii. We first consider whether the preambles are limiting in view of the principles below.

"Generally," we have said, "the preamble does not limit the claims." *Allen Eng'g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1346 (Fed. Cir. 2002). Nonetheless, the preamble may be construed as limiting "if it recites essential structure or steps, or if it is 'necessary to give life, meaning, and vitality' to the

Motion for Admission *Pro Hac Vice*. See Ex. 2003. We understand Patent Owner to be referring to Exhibit 2004. Tr. 21:9–26, 39:11–25.

claim.” *Catalina Mktg. Int’l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002), quoting *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999). A preamble is not regarded as limiting, however, “when the claim body describes a structurally complete invention such that deletion of the preamble phrase does not affect the structure or steps of the claimed invention.” *Catalina*, 289 F.3d at 809.

Am. Medical Sys., Inc. v. Biolitec, Inc., 618 F.3d 1354, 1358–59 (Fed. Cir. 2010). Each of proposed substitute claims 49 and 61 recites an “adaptive smart antenna.” Mot. to Amend i, vii.

Patent Owner takes the position that the preambles of proposed substitute claims 49 and 61 are limiting. For instance, Patent Owner asserts that its amendment to each of proposed substitute independent claims 49 and 61 responds to a ground of unpatentability in the trial (37 C.F.R. 42.121(a)(2)(i)) because “[n]one of the references in this proceeding teach the proposed limitations reciting a system or device compliant with IEEE [The Institute of Electrical and Electronics Engineers] 802.11 standards.” Mot. to Amend 21. Patent Owner also asserts written description support is provided for the preambles of proposed substitute claims 49 and 61 rather than assert that they are not limiting. *Id.* at 5, 10; MTA Reply 4–6. Petitioner does not dispute that the preambles are limiting. *See generally* MTA Opp.

The parties’ positions are consistent with the recitation of “wireless communication system compliant with IEEE 802.11 standards” being necessary to give meaning to the recitation of “adaptive smart antenna” recited in those claims, as understood in light of the ’296 Patent Specification. For instance, the summary of the invention of the ’296 Patent Specification describes that “[m]ethods and apparatuses are prov[ided] which allow a wireless communication system using a smart antenna(s) to

selectively cause a receiving device to switch its operative association from one transmitted beam to another available transmitted beam.” Ex. 1001, 2:54–58. Furthermore, the ’296 Patent Specification generally describes the invention with respect to a wireless communication system. *See, e.g.*, Ex. 1001, 4:6–12, 4:61–5:16, Fig. 1. We, therefore, determine that the preambles of proposed substitute claims 49 and 61 are limiting.

We next consider the parties’ contentions regarding written description support for “a wireless communication system compliant with 802.11 standards” recited in the preambles of proposed substitute claims 49 and 61. Mot. to Amend i, viii. Relying on the testimony of Dr. Short, Patent Owner identifies three portions of the ’296 Patent Specification that Patent Owner asserts provide written description support. Mot. to Amend 5, 10 (citing Ex. 1001, 4:39–47, 6:14–16, 8:34–37; Ex. 2004 ¶¶ 27–29, 48–50).

Of the identified portions, the only portion of the ’296 Patent Specification that refers to “compliant” and “802.11” is below, as well as the immediately subsequent description.

One of the benefits to method 200 is that conventional IEEE 802.11 family compliant client devices need not be changed or altered to work with the methods and apparatuses described herein. Thus, for these types of systems, only access point 102 and possibly access point 108 *need to be altered or modified*.

Ex. 1001, 8:34–39 (emphasis added). Regarding the aforementioned portion, Dr. Short testifies that “[t]he specification also teaches that a benefit of the disclosed invention[] is that ‘conventional IEEE 802.11 family compliant client devices need not be changed or altered to work with the methods and apparatuses described herein.’” Ex. 2004 ¶ 29 (citing Ex. 1001, 8:34–37).

Importantly, however, consistent with Dr. Negus's testimony (Ex. 1020 ¶¶ 24–25 (cited at MTA Opp. 6)), that portion of the '296 Patent Specification describes that the systems are not "IEEE 802.11 family compliant" because certain access points "need to be altered or modified." Ex. 1001, 8:34–39. Dr. Negus testifies that "a POSITA would understand "that the '296 Patent in this embodiment is describing that only 'client devices' that are 'conventional'" would remain compliant and further "the 'access point' would be 'altered or modified,' thereby not remaining 'compliant with IEEE 802.11 standards' or 'compliant with 802.11 standards.'" Ex. 1020 ¶ 25.

Patent Owner asserts "the '296 disclosure's reference to 'alter[ing] or modify[ing]' the access point is specifically in reference to a modification that would allow the provision of multiple beams, while still maintaining compliance in accordance with the teachings of the disclosure." MTA Reply 5 (citing Ex. 2011 ¶ 32). Dr. Short testifies "[t]he '296 patent's disclosure relating to 'method 200' teaches the provision of multiple beams" and, therefore, "a POSA would have understood that alterations and modifications discussed are alterations and modifications that would need to be made to the access point to allow for these multiple beams to be provided, while still retaining 802.11 compliance." Ex. 2011 ¶ 32 (citing Ex. 1001, 6:64–8:28).

Consistent with Petitioner's contentions and Dr. Negus's testimony (MTA Opp. 6; Ex. 1020 ¶¶ 24–25), however, Patent Owner does not identify disclosure in the '296 Patent Specification that the altered or modified access point would retain 802.11 compliance. Indeed, the portion of the '296 Patent Specification relied upon by Patent Owner and Dr. Short cited as additional support, does not describe that the access point would retain

802.11 compliance. *See* Ex. 1001, 6:64–8:28. That portion, instead, describes the operation of beam switching logic 110 and describes that “access point 102 and possibly access point 108 need to be altered or modified” without any description indicating that the access points would be compliant after alteration or modification. *Id.* at 8:38–39. That it would have been obvious for one having ordinary skill in the art to alter or modify an access point and retain compliance does not establish written description support. One shows that one is “in possession” of the invention by describing the invention, with all its claimed limitations, not that which makes it obvious. *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997).

Patent Owner also asserts that the aforementioned description refers to “only one embodiment, which cannot negate other embodiments.” MTA Reply 5. Patent Owner, however, identifies only three portions of the ’296 Patent Specification that Patent Owner asserts provide written description support for the proposed amendment of “802.11 standards” in the proposed substitute claims and the aforementioned portion is one of those three portions. Mot. to Amend 5, 10 (citing Ex. 1001, 4:39–47, 6:14–16, 8:34–37). Notably, it is the only portion of the three that refers to “compliant” and “802.11.” Ex. 1001, 4:39–47, 6:14–16, 8:34–37. We discuss below deficiencies in the other two portions relied upon by Patent Owner. Ex. 1001, 4:39–47, 6:14–16 (cited at Mot. to Amend 5, 10).

We now turn to another of the portions of the ’296 Patent Specification that Patent Owner asserts provide written description support, which is set forth below:

The exemplary methods and apparatuses are adaptable to various protocols and/or standards. For demonstrative purposes

and not by way of limitation, the examples presented herein are directed towards wireless IEEE 802.11 type network configurations, wherein the client device is capable of roaming within the coverage area of the smart antenna and the client device is configured to establish an association with an access point over a main beam.

Ex. 1001, 4:39–47 (cited at Mot. to Amend 5, 10).

Relying on the testimony of Dr. Negus, Petitioner asserts that “directed *towards* wireless IEEE 802.11 type network configurations” (Ex. 1001, 4:39–47) does not describe a compliant wireless communications system. MTA Opp. 7 (citing, *e.g.*, Ex. 1020 ¶ 26). Dr. Negus testifies that “in my opinion, a POSITA would understand from the above passage in the ‘296 Patent that the alleged invention is adapted to various protocols or ‘directed towards wireless IEEE 802.11 type network configurations’ without any discussion of ‘compliance’ with the standard.” Ex. 1020 ¶ 26. Dr. Negus further testifies that “only the ‘client device is capable of roaming’, thereby further teaching that such ‘client devices’ are ‘conventional’, in contrast to the ‘access point’ that would be ‘altered or modified.’” *Id.* We credit and give significant weight to Dr. Negus’s testimony because it is consistent with the evidence cited therein.

Patent Owner contends that because the ‘296 Patent Specification refers to “wireless IEEE 802.11 type network configurations” (Ex. 1001, 4:39–47), “the ‘296 patent *teaches* ‘a wireless communication system compliant with IEEE 802.11 standards.’” MTA Reply 4–5 (citing, *e.g.*, Ex. 2011 ¶¶ 28–31; Ex. 2012 ¶ 32) (emphasis added). Patent Owner relies on the testimony of Dr. Short and Dr. Short testifies that he relies on the testimony of Dr. Winters submitted in another proceeding, also relating to the ‘296 Patent. Ex. 2011 ¶¶ 28–31 (citing Ex. 2012 ¶ 32). We give little to

no weight to Dr. Short's testimony because his testimony takes Dr. Winters's testimony out of context and Dr. Short's testimony is not consistent with the '296 Patent Specification. Contrary to Dr. Short's testimony (Ex. 2011 ¶ 31), Dr. Winters testifies that "it is undisputed that the only access point disclosed in the '296 specification is modified such that it is noncompliant with the IEEE 802.11 standards" so "[t]he *system* including this access point, therefore, is also *noncompliant*." Ex. 2012 ¶ 32 (emphases added).¹⁴ The portions of the '296 Patent Specification relied upon by Dr. Short do not describe 802.11 access point or system compliance. Ex. 1001, 4:39–47, 6:14–16, 8:34–37. Indeed, Patent Owner asserts that 802.11 compliance requires adherence to IEEE's mandatory technological requirements, but such description is lacking in the '296 Patent Specification because "a patent need not teach, and preferably omits, what is well known in the art." MTA Reply 8 (citing *Falko-Gunter Falkner v. Inglis*, 448 F.3d 1357, 1365 (Fed. Cir. 2006)).

As discussed above, one shows that one is "in possession" of the invention by describing the invention, with all its claimed limitations, not that which makes it obvious. *Lockwood*, 107 F.3d at 1572. We, therefore, determine Patent Owner's contentions relying on 802.11 compliance being known in the art do not establish written description support.

The remaining portion of the '296 Patent Specification that Patent Owner asserts provides written description support is "[i]n certain

¹⁴ We discuss further reasons why Dr. Winters's testimony supports that Patent Owner did not establish that the '296 Patent Specification provides written description support in our Final Written Decision in the related proceeding. See *Cisco Systems, Inc. v. XR Communications, LLC*, IPR2018-00764, Paper 46 at 63–74 (PTAB Sept. 16, 2019).

implementations, for example, *communication logic 118* would therefore be configured to perform an association process that establishes a communication link under IEEE 802.11(a), IEEE 802.11(b), IEEE 802.11(g), etc.” Ex. 1001, 6:14–16 (emphasis added). Communication logic 118 is illustrated in client device 104. *Id.* at Fig. 1; *see also id.* at 6:7–8 (describing “client device 104 includes communication logic 118, a transceiver 120 and an antenna 122”). Therefore, the remaining portion suffers from the same deficiency as the first portion in that it refers to only the client device. *Id.* The remaining portion also suffers from the same deficiency as the second portion by referring to establishing a communication link, without describing access point compliance. *Id.* For this remaining portion, Patent Owner again relies on the testimony of Dr. Short that was discussed above with respect to the first two portions. MTA Reply 4; Ex. 2011 ¶¶ 28–29. Dr. Short’s initial Declaration simply repeats the portions of the ’296 Patent Specification reproduced above and is deficient for the same reasons discussed with respect to those portions. Ex. 2004 ¶¶ 27–29.

We now turn to “a first device compliant with IEEE 802.11 standards” recited in proposed substitute claims 49 and 55. Mot. to Amend i, v. Patent Owner and Dr. Short identify the same portions of the ’296 Patent Specification discussed above as providing written description support for this limitation. Mot. to Amend 5–6 (citing Ex. 1001, 4:41–53, 8:34–37); Ex. 2004 ¶ 35 (citing Ex. 1001, 4:41–53, 8:34–37). The “first device” corresponds to “an access point” (Mot. to Amend 5–6; Ex. 1001, 2:62–64) and each of claims 49 and 55 recite “a first device . . . having an adaptive smart antenna” (Mot. to Amend i, v). As discussed above, only one portion of the ’296 Patent Specification refers to “compliant” and “802.11,” but that

discussion is limited to *client* devices and describes that “access point 102 and possibly access point 108 need to be altered or modified.” Ex. 1001, 8:34–39. For the same reasons given above with respect to “a wireless communication system compliant with 802.11 standards” recited in proposed substitute claims 49 and 61, we credit and give significant weight to Dr. Negus’s testimony (Ex. 1020 ¶¶ 23–27) over that of Dr. Short (*see, e.g.*, Ex. 2004 ¶¶ 27–29, 35, 48–50) that the ’296 Patent Specification does not provide written description support for the proposed amendments.

Although *ipsis verbis* support for claim terms is not necessary, it is incumbent upon the Patent Owner to set forth where the original disclosure provides written description support for the new limitations in the substitute claims. Patent Owner has not done so with respect to “a first device compliant with IEEE 802.11 standards” recited in proposed substitute claims 49 and 55 and “a wireless communication system compliant with 802.11 standards” recited in proposed substitute claims 49 and 61. Mot. to Amend i–viii. We, therefore determine that the original disclosure lacks written description support for proposed substitute independent claims 49, 55, and 61.

Each of proposed substitute dependent claims 50–54, 56–60, and 62–65 depend, directly or indirectly, from one of proposed substitute independent claims 49, 55, and 61. Upon consideration of the record before us, Patent Owner does not remedy the aforementioned deficiencies in its discussion of proposed substitute dependent claims 50–54, 56–60, and 62–65. We, therefore, also determine the original disclosure lacks written description support for proposed substitute dependent claims 50–54, 56–60, and 62–65.

3. *Discussion—Obviousness*

As a separate, independent reason, we also determine based on a preponderance of the evidence that the proposed substitute claims are unpatentable under 35 U.S.C. § 103(a) as obvious over the asserted art. As discussed *supra* in Section II.D, Petitioner has shown by a preponderance of the evidence that the original claims are obvious over the asserted prior art combinations set forth in the Petition.

Petitioner asserts that the combination of Reudink, Antonio, and 802.11¹⁵ renders proposed substitute claims 49–65 obvious. MTA Opp. Pet. 11–25. Petitioner provides detailed explanations as to how the prior art combination purportedly teaches or suggests each limitation of claim 1, and provides purported reasons why one of ordinary skill would have combined the prior art teachings, citing Dr. Negus’s testimony for support. *Id.* (citing, *e.g.*, Ex. 1020).

Based on the record before us, Petitioner has shown how the combined teachings of Reudink, Antonio, and 802.11 teach or suggest each limitation of proposed substitute claims 49–65 and we agree with Petitioner’s reasoning that the skilled artisan would have been motivated to combine the references as proposed. As discussed below, we determine that Patent Owner’s arguments do not undermine Petitioner’s showing.

¹⁵ THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC. (IEEE STANDARD 802.11 FOR INFORMATION TECHNOLOGY (1999) (Ex. 1017, “802.11”).

a. “compliant with IEEE 802.11 standards”—
Proposed Substitute Claims 49, 55, and 61

That 802.11 is prior art to the '296 Patent is not disputed. MTA Opp. 11–12; MTA Reply 7–9. Relying on the testimony of Dr. Negus, Petitioner provides detailed contentions explaining why a person having ordinary skill in the art would have been motivated to combine the 802.11 protocol for data communication, authentication, and association services for an access point with the teachings of Reudink and showing that the skilled artisan would have had a reasonable expectation of success in doing so. MTA Opp. 11–20 (citing, *e.g.*, Ex. 1020 ¶¶ 53, 74, 89, 112, 121–132, 135–136, 138–143). For instance, Petitioner explains that a person having ordinary skill in the art would have been motivated to combine 802.11 with the teachings of Reudink because Reudink discloses using a frequency in a range (1–3 GHz (Gigahertz)) including that of 802.11 (the 2.4 GHz band) and the skilled artisan would have been motivated to select the 802.11 protocol to reduce expense and increase capacity. *Id.* at 13–20 (citing, *e.g.*, Ex. 1020 ¶¶ 121–132, 135–136, 138–143).

Dr. Negus testifies that a person having ordinary skill in the art would have known that “licensed spectrum in the 1–3 GHz range is ‘expensive’” and using “the unlicensed 2.4 GHz spectrum” of 802.11 would have resulted in “significant spectrum cost savings.” Ex. 1020 ¶ 127. Dr. Negus also testifies that other “market forces” would have provided “an incentive” for a person having ordinary skill in the art to combine Reudink with 802.11 including that 802.11 was “widely used” and “popular.” *Id.* ¶¶ 123–124, 128. Dr. Negus further testifies that “Reudink teaches improvements for frequency reuse by using multiple antenna beams” and a person having ordinary skill in the art would have been motivated to combine the teachings

of Reudink and 802.11 to “improve the capacity” of a local network.
Id. ¶ 129.

Patent Owner asserts “Petitioner’s Opposition relies on a POSA replacing Reudink’s CDMA architecture with 802.11’s optional PCF [point control function] architecture.” MTA Reply 10 (citing MTA Opp. 18–19; Ex. 1017, 70; Ex. 2011 ¶¶ 42–44). Relying on the testimony of Dr. Short, Patent Owner asserts that Petitioner does not take into consideration potential disadvantages and costs from the modification and that the advantages identified by Petitioner do not apply to 802.11 optional PCF mode. *Id.* at 10–12; Ex. 2011 ¶¶ 42–52. Patent Owner also asserts that U.S. Patent No. 6,865,609 (“Gubbi”) “provides a list of significant disadvantages of using the optional PCF mode of 802.11.” MTA Reply 10 (citing Ex. 1022, 8:61–9:55; Ex. 2011 ¶ 45).

Petitioner responds that, contrary to Patent Owner’s contentions and Dr. Short’s testimony, Petitioner’s Opposition does not rely on only 802.11’s optional PCF architecture. MTA Sur-Reply 7–11. Petitioner merely points to 802.11’s PCF feature as one way to implement control signaling, but Petitioner’s proposed combination does not rely on use of the PCF feature. *Id.* Petitioner further contends that even the proposed example of using PCF for control signaling does not have Patent Owner’s asserted drawbacks because the drawbacks pertain to data communications, not control signaling and Reudink’s solution improves on Patent Owner’s asserted drawbacks, which supports Petitioner’s position that a person having ordinary skill in the art would have had a reason to combine the teachings in the manner proposed by Petitioner. *Id.* Petitioner also contends Gubbi does not teach away from the proposed combination. *Id.* at 11.

We agree with Petitioner and we credit and give significant weight to the testimony of Dr. Negus over the testimony of Dr. Short because Petitioner's contentions and Dr. Negus's testimony are consistent with the evidence of record. For instance, Petitioner's contentions and Dr. Negus's testimony regarding PCF are provided in connection with reasonable expectation of success to show by way of one example that Reudink's control signaling could be implemented within frames reserved for use by proprietary methods without changing 802.11 architecture existing at that time. *See, e.g.*, Ex. 1020 ¶¶ 134–142. Other examples are provided, *e.g.*, other, known combinations of proprietary technologies with 802.11 and we are persuaded that Petitioner's other examples are consistent with the evidence cited therein. *Id.* ¶¶ 131–145. Dr. Short's testimony does not take into consideration those other examples. *See, e.g.*, Ex. 2004 ¶¶ 85–100; Ex. 2011 ¶¶ 42–58.

Furthermore, we determine Petitioner has shown that even the proposed example does not have the asserted drawbacks, for example, because 802.11 describes the detailed specifications for PCF that are consistent with and supporting of Petitioner's contentions and Dr. Negus's testimony, including generation of contention-free frame transfer. *See, e.g.*, Ex. 1017, 70–71, 86–93; Ex. 1020 ¶¶ 74–76, 96–100. Additionally, Gubbi does not teach away and, instead, describes a scheme offered as “a supplement” to 802.11, consistent with Petitioner's contentions and Dr. Negus's testimony. *See generally* Ex. 1022.

Furthermore, Petitioner's contentions and Dr. Negus's testimony that a person having ordinary skill in the art would have been motivated by market forces, including that 802.11 was widely used and popular, are consistent with evidence submitted by Dr. Negus supporting his conclusions.

See, e.g., Ex. 1023, 1 (describing “rapid growth” of 802.11 and that “the technology [is] becoming popular at an exponential rate”), 2 (“802.11 is currently the most widespread protocol for wireless networks in the United States”); Ex. 1024, 1 (“802.11b is not just popular, it is now widespread” and “[s]hipments of 802.11b WLAN . . . components now exceed 3 million units per quarter”). Also consistent with Petitioner’s contentions and Dr. Negus’s testimony, the evidence of record shows that 802.11 describes using frequency spectrum in a range Reudink identifies as advantageous. In particular, Reudink describes “[s]pectrum in the 1–3 GZ range may be utilized to attain high peak rates” and it “is becoming widely used for a range of wireless communications.” Ex. 1009, 1:32–42. Reudink also describes that “[t]his results in both the spectrum being expensive as well as potentially having a high level of noise energy.” *Id.* at 1:40–44. Reudink describes that its system and method is robust and spectrally efficient so as to make the best use of such frequencies. *Id.* at 2:5–40. Furthermore, consistent with Petitioner’s contentions and Dr. Negus’s testimony, 802.11 describes using frequency spectrum in the 1–3 GZ range, for example, by describing “[t]he PHY services provided to the IEEE 802.11 wireless LAN MAC for the 2.4 GHz frequency-hopping spread spectrum (FHSS) system.” Ex. 1017, 148; *see also id.* at 195 (describing physical layer services provided to the IEEE 802.11 wireless LAN MAC for the 2.4 GHz direct sequence spread spectrum (DSSS)).

Accordingly, we determine that Petitioner has demonstrated by a preponderance of the evidence that “compliant with IEEE 802.11 standards” is taught by the asserted art. We also determine that Petitioner has articulated reasoning with rational underpinning to support the conclusion that one

having ordinary skill would have had reason to combine the teachings in the manner advanced by Petitioner.

b. “an adaptive smart antenna”— Proposed Substitute Claims 49, 55, and 61

Relying on the testimony of Dr. Negus, Petitioner asserts that Reudink discloses this recitation. MTA Opp. 20 (citing, *e.g.*, Ex. 1009, 7:5–7, 7:12–16; Ex. 1020 ¶¶ 150–152). Consistent with Petitioner’s contentions and Dr. Negus’s testimony, Reudink teaches using “adaptive array[s].” *See, e.g.*, Ex. 1009, 7:12–16. Patent Owner does not argue this recitation separately.

We agree with Petitioner’s contentions and we credit and give significant weight to the testimony of Dr. Negus because both are consistent with the evidence of record. Accordingly, we determine that Petitioner has demonstrated by a preponderance of the evidence that “an adaptive smart antenna” is taught by the asserted art.

c. “wherein said information comprises at least one of a distance parameter or an angular parameter”— Proposed Substitute Claims 49, 55, and 61

Relying on the testimony of Dr. Negus, Petitioner asserts Reudink teaches both a distance parameter and an angular parameter. MTA Opp. 20–21 (citing, *e.g.*, Ex. 1009, 11:64–66, 19:1–4; Ex. 1020 ¶¶ 155–159). Reudink’s disclosure is consistent with Petitioner’s contentions and Dr. Negus’s testimony because Reudink describes that “[t]he current antenna beam information provides the current antenna beam number and pointing angle.” Ex. 1009, 11:64–66. Additionally, Reudink describes that the database stores “information regarding position and/or distance of the RSs,”

which also teaches both a distance parameter and an angular parameter.
Ex. 1009, 19:1–4. Patent Owner does not argue this recitation separately.

We agree with Petitioner’s contentions and we credit and give significant weight to the testimony of Dr. Negus because both are consistent with the evidence of record. Accordingly, we determine that Petitioner has demonstrated by a preponderance of the evidence that “wherein said information comprises at least one of a distance parameter or an angular parameter” is taught by the asserted art.

d. “such that the first device is configured to consider interfering signals in the determination”— *Proposed Substitute Claim 49*

Relying on the testimony of Dr. Negus, Petitioner asserts that Reudink “considers interfering signals in the determination.” MTA Opp. 21 (citing, *e.g.*, Ex. 1009, 4:19–27, 15:11–20, 18:4–32, 18:53–61; Ex 1020 ¶¶ 163–66). Reudink’s teachings are consistent with Petitioner’s contentions and Dr. Negus’s testimony. Ex. 1009, 4:19–27 (describing that “the systems and methods of the present invention operate to determine inter-cell interference” and the information is stored in a database), 15:11–20 (determining “which antenna beams and RSs, may be operated on a same channel . . . with tolerable co-channel interference”), 18:4–32 (describing “inter-cell interference” and creating a “forbidden beam matrix”), 18:53–61 (“In this example, resources (i.e., channels and/or antenna beams) would preferably be allocated to avoid simultaneous use of the indicated antenna beams with respect to a same channel so that intolerable co-channel interference does not occur”). Patent Owner does not argue this recitation separately.

We agree with Petitioner’s contentions and we credit and give significant weight to the testimony of Dr. Negus because both are consistent with the evidence of record. Accordingly, we determine that Petitioner has demonstrated by a preponderance of the evidence that “such that the first device is configured to consider interfering signals in the determination” is taught by the asserted art.

*e. “including an angular direction of”—
Proposed Substitute Claims 53, 59, and 64*

Relying on the testimony of Dr. Negus, Petitioner refers to the same teachings (MTA Opp. 21 (citing, *e.g.*, Ex. 1020 ¶¶ 170–171) that we agree with for the reasons discussed above (*see supra* § II.E.3.c). Patent Owner does not argue this recitation separately. Accordingly, we determine that Petitioner has demonstrated by a preponderance of the evidence that “including an angular direction of” is taught by the asserted art.

*f. “a number of downlink transmittable messages comprising a null-data frame over at least said different beam” and “gather signal parameter information from a number of uplink transmittable messages”— Proposed
Substitute Claims 51, 57, and 62*

Relying on the testimony of Dr. Negus, Petitioner asserts that the combination of Reudink and 802.11 teaches these recitations. MTA Opp. 21–25 (citing, *e.g.*, Ex. 1017, v, 14, 27–28, 36, 38, 83, 86, 88, 90, 92, 96; Ex. 1020 ¶¶ 179–190, 192, 200, 202, 204–207); Pet. 47–56. Petitioner also provides reasoning to combine the teachings of the reference in the manner claimed, including that Petitioner refers back to its reasoning given with respect to the independent proposed substitute claims. *Id.* Reudink’s teachings of MBAACH messaging is consistent with Petitioner’s

contentions and Dr. Negus’s testimony. *See e.g.*, Ex. 1009, 11:1–4, 12:55–59; *see also supra* §§ II.D.3 (discussing in further detail why we are persuaded by Petitioner’s contentions regarding MBAACH messaging). 802.11 describes transmission of management and control information, as well as polling and acknowledgement. *See, e.g.*, Ex. 1017, 36 (describing type descriptions of management and control), 83 (describing an acknowledgement procedure), 86 (describing data sent in respond to polling), 90 (describing the PC transmitting management frames). We agree with Petitioner’s contentions and we credit and give significant weight to the testimony of Dr. Negus because both are consistent with the evidence of record, including the evidence cited therein, and for the additional reasons given above (*see supra* §§ II.D.3, II.E.3.c).

Accordingly, we determine that Petitioner has demonstrated by a preponderance of the evidence that “a number of downlink transmittable messages comprising a null-data frame over at least said different beam” and “gather signal parameter information from a number of uplink transmittable messages” are taught by the asserted art. We also determine that Petitioner has articulated reasoning with rational underpinning to support the conclusion that one having ordinary skill would have had reason to combine the teachings in the manner advanced by Petitioner.

g. Conclusion—Obviousness of Proposed Substitute Claims 49–65

We determine that Petitioner has demonstrated by a preponderance of the evidence that each of the limitations in proposed substitute claims 49–65 is taught by the asserted art. *See generally* MTA Opp. We also determine that Petitioner has articulated reasoning with rational underpinning to

support the conclusion that one having ordinary skill would have had reason to combine the teachings in the manner advanced by Petitioner. *Id.*

Accordingly, based on our review of the parties' arguments and evidence, Petitioner has shown by a preponderance of the evidence that the proposed substitute claims 49–65 would have been obvious over the asserted art.

4. *Conclusion—Motion to Amend*

Based on the evidence in the entire trial record, we determine that Patent Owner's Motion to Amend does not establish that the original application provides written description support for proposed substitute claims 49–65. Additionally, Petitioner has shown by a preponderance of the evidence that the proposed substitute claims would have been obvious over the asserted art. Accordingly, Patent Owner's Motion to Amend is *denied*.

III. CONCLUSION¹⁶

In summary:

¹⁶ 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. 16654 (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) (2019).

Claims	35 U.S.C.	Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1, 2, 4–7, 17, 18, 20–23, 33, and 35–38	§ 103(a)	Reudink and Antonio	1, 2, 4–7, 17, 18, 20–23, 33, and 35–38	
Overall Outcome			1, 2, 4–7, 17, 18, 20–23, 33, and 35–38	

Motion to Amend Outcome	Claims
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in the Amendment	49–65
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	49–65
Substitute Claims: Not Reached	

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1, 2, 4–7, 17, 18, 20–23, 33, and 35–38 of the '296 Patent have been proven to be unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Amend is *denied*; 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.

IPR2018-01017
Patent 7,062,296 B2

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