

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.

Case IPR2018-01018
Patent 7,729,728 B2

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

McMILLIN, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining the Challenged Claim 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”)¹ filed a Petition (Paper 1, “Pet.”) to institute an *inter partes* review of claim 16 of U.S. Patent No. 7,729,728 B2 (Ex. 1004, “the ’728 patent”). XR Communications LLC d/b/a Vivato Technologies (“Patent Owner”), filed a Preliminary Response. Paper 9 (“Prelim. Resp.”). We instituted this review. Paper 12 (“Inst. Dec.”).

Subsequent to institution, Patent Owner filed a Response. Paper 24 (“PO Resp.”). Petitioner filed a Reply. Paper 30 (“Reply”). Patent Owner filed a Sur-reply. Paper 33 (“Sur-reply”).²

Patent Owner also filed a Motion to Amend. Paper 25 (“Mot. to Amd.”). Petitioner filed an Opposition. Paper 31 (“MTA Opp.”). Patent Owner filed a Reply in Support of its Motion to Amend. Paper 32 (“MTA Reply”). Petitioner filed a Sur-reply to Patent Owner’s Reply. Paper 35 (“MTA Sur-reply”).

This Final Written Decision is entered pursuant to 35 U.S.C. §318(a) and 37 C.F.R. §42.73. After reviewing the arguments and evidence, we conclude that Petitioner has met its burden of showing, by a preponderance

¹ Petitioner also identifies ARRIS International plc and ARRIS Enterprises, LLC, as real parties-in-interest “[o]ut of an abundance of caution.” Pet. 2.

² There was no oral argument. The parties requested that the transcript of the oral hearing in IPR2018-01017, conducted on July 19, 2019, be made part of the record in this proceeding. Ex. 3001. We granted this request. Paper 38, 2 (“Based on the agreement of the parties, we will make the transcript of the oral argument in IPR2018-01017 part of the record in the instant proceeding and treat the oral argument in IPR2018-01017 as applicable to this proceeding to the extent that upon review of that transcript we determine it is applicable.”). The transcript from IPR2018-01017 is Exhibit 3002.

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of the evidence, that claim 16 of the '728 patent is unpatentable. And, we deny the Motion to Amend.

A. *Related Matters*

The parties indicate that the '728 patent has been asserted in the following litigations:

XR Communications, LLC d/b/a Vivato Technologies v. ARRIS International plc, 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 Corporation 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*, 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.*, 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. 7–8; Paper 4, 2–4.

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Claim 16 of the '728 patent was also challenged in IPR2018-00726 and IPR2018-00763. A Final Written Decision (Paper 38) was entered in IPR2018-00726 on October 1, 2019, in which it was concluded that claim 16 of the '728 patent was unpatentable. A Final Written Decision (Paper 38) was entered in IPR2018-00763 on October 3, 2019, in which it was concluded that claim 16 of the '728 patent was unpatentable and a motion to amend was denied. The combinations of references asserted in IPR2018-00726 and IPR2018-00763 were different than the combinations asserted in this proceeding.

The '728 patent issued from a continuation of the application from which US 7,062,296 B2 (Ex. 1001) issued. US 7,062,296 B2 was challenged in IPR2018-00725, IPR2018-00764, and IPR2018-01017. A Final Written Decision (Paper 42) was entered in IPR2018-00725 on September 4, 2019. A Final Written Decision (Paper 46) was entered in IPR2018-00764 on September 16, 2019. A Final Written Decision (Paper 44) was entered in IPR2018-01017 on October 10, 2019.

B. The '728 Patent

The '728 patent is titled “Forced Beam Switching in Wireless Communication Systems Having Smart Antennas.” Ex. 1004, code (54). The '728 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. *Id.* at 1:15–20. According to the '728 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 '728 patent is reproduced below.

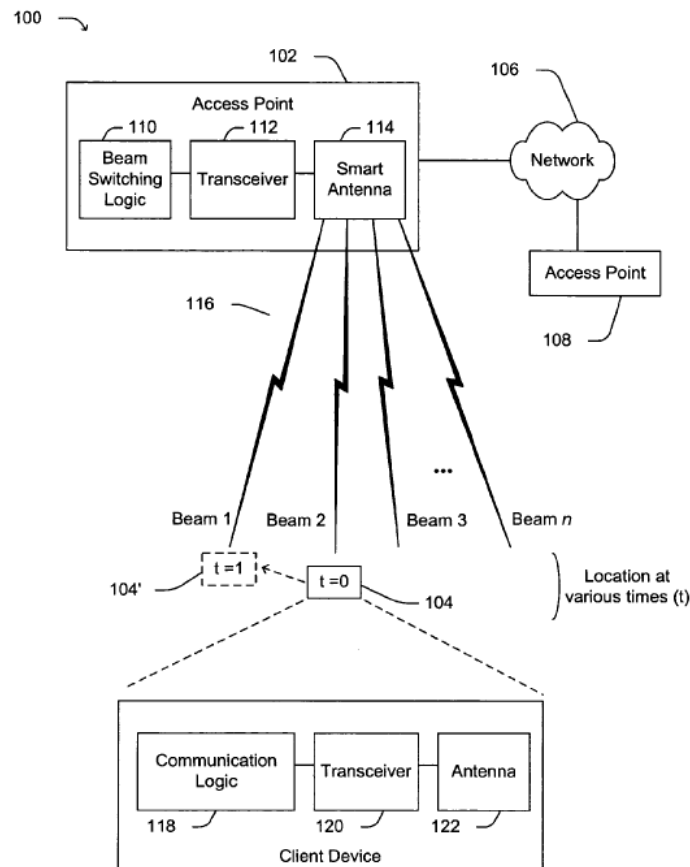


Fig. 1

Figure 1 depicts a block diagram of wireless communications system 100 having access point 102 in communication with client 104 over one of main beams 116. Ex. 1004, 5:1–3. As shown in Figure 1, access point 102 includes beam switching logic 110, smart antenna 114, and transceiver 112, which is coupled to 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. Challenged Claim

Petitioner challenges claim 16 of the ’728 patent. Pet. 5. Claim 16 recites:

16. A wireless communication system, comprising:

a phased array antenna configured to transmit beam downlinks;

a transceiver operatively coupled to the phased array antenna and configured to send and receive electromagnetic signals via the phased array antenna; and

an access point that includes the phased array antenna and the transceiver, the access point configured to:

selectively allow a receiving device to operatively associate with a beam downlink transmitted to the receiving device via the phased array antenna;

receive an uplink transmission from the receiving device through the phased array antenna;

determine from the uplink transmission if the receiving device should operatively associate with a different beam downlink transmission; and

at least one of: allow the receiving device to operatively associate with the different beam downlink if determined that the receiving device should operatively associate with the

different beam downlink; force the receiving device to operatively associate with the different beam downlink if determined that the receiving device should be operatively associated with the different beam downlink;

wherein the access point is further configured to actively probe the receiving device by generating a signal to initiate that the phased array antenna transmit at least one downlink transmittable message over the beam downlinks, and gather signal parameter information from uplink transmittable messages received from the receiving device through the phased array antenna.

Ex. 1004, 12:25–55.

D. Cited Art

Petitioner relies on the following references:

Reudink et al., US 7,039,441 B1 (Ex. 1009) and Antonio et al., US 6,208,858 B1 (Ex. 1010).

The earliest priority date claimed for the '728 patent is November 4, 2002, based on U.S. Provisional Application No. 60/423,660. Ex. 1004, code (60), 1:7–15. Reudink was filed on October 19, 1999. Ex. 1009, code (22). Antonio issued on March 27, 2001. Ex. 1010, code (22). Patent Owner does not challenge the prior art status of any of the cited references. *See generally* PO Resp. At oral argument in IPR2018-01017, the attorneys for the parties confirmed that there is no dispute that Reudink and Antonio are prior art. Ex. 3002, 7:14–16 (Petitioner's attorney), 34:25–27 (Patent Owner's attorney). The cited references qualify as prior art to the '728 patent.

E. Asserted Ground of Unpatentability

Petitioner asserts that claim 16 of the '728 patent is unpatentable on the following ground (Pet. 6):

Claim Challenged	35 U.S.C. §	Reference(s)/Basis
16	103 ³	Reudink, Antonio

In support of its contentions, Petitioner relies on declarations of Kevin J. Negus, Ph.D., Exhibits 1006 and 1020. Dr. Negus is a technical declarant retained for this proceeding. Ex. 1006 ¶ 1. In support of its contentions, Patent Owner relies on declarations of Robert Short, Ph.D., Exhibits 2002 and 2010. Dr. Short is a technical declarant retained by Patent Owner. Ex. 2002 ¶ 1.

II. ANALYSIS

A. Claim Construction

In the Petition, Petitioner requests construction of the claim terms “phased array antenna,” “operatively associate,” and “access point.” Pet. 27–30. In the Response, Patent Owner does not address claim construction and directs all its argument towards a single claim limitation: “the access point configured to . . . determine from the uplink transmission if the receiving device should operatively associate with a different beam downlink transmission.” *See generally* PO Resp. In the Reply, Petitioner states, “[n]otably, neither party has proposed a claim construction of [the disputed limitation].” Reply 5. And, in relation to its Motion to Amend, Patent Owner proposes no claim construction. Mot. to Amd. 17. Petitioner

³ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. § 103. Because the '728 patent has an effective filing date before the effective date of the applicable AIA amendment, we refer to the pre-AIA version of 35 U.S.C. § 103.

proposes no claim construction in its Opposition to the Motion to Amend. *See generally* MTA Opp. We determine that no terms require express construction. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (stating that only those terms that are in controversy need to be expressly construed, and only to the extent necessary to resolve the controversy).

B. Legal Standards

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness.⁴ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). Petitioner cannot satisfy its

⁴ Neither party presents any objective evidence of nonobviousness or any related arguments for us to consider.

burden of proving obviousness by employing “mere conclusory statements.”

In re Magnum Oil Tools Int’l, Ltd., 829 F.3d 1364, 1380 (Fed. Cir. 2016).

C. Level of Skill in the Art

With regard to the level of ordinary skill in the art, Petitioner contends:

[A] POSITA^[5] would have had Bachelor of Science in Electrical Engineering, or an equivalent field, as well as three to four years of experience in the field of wireless communications; or a Master’s degree in Electrical Engineering, or an equivalent field, as well as two years of experience in the field of wireless communications.

Pet. 30 (citing Ex. 1006 (Negus Decl.) ¶ 29). In its Response, Patent Owner does not address this issue. *See generally* PO Resp. In its Motion to Amend, the Patent Owner states, “Patent Owner agrees with Petitioner’s expert regarding the level of ordinary skill in the art, although someone with less education but more experience, or more education but less experience could also have met this standard.” Mot. to Amd. 15 (citing Ex. 2006 (Short Decl.) ¶ 24). At oral argument in IPR2018-01017, the attorney for the Patent Owner confirmed that there was no dispute with regard to the level of skill in the art. Ex. 3002, 34:22–24. We determine that the aforementioned argument is applicable to this proceeding because the ’728 patent is related to the patent challenged in IPR2018-01017 (*see supra* § I.A). Based on the evidence and because it is consistent with the prior art of record, we adopt the level of ordinary skill in the art as proposed by Petitioner.

⁵ Petitioner uses the acronyms “POSITA” and “POSA” to mean a person having ordinary skill in the art.

D. Asserted Obviousness of Claim 16 Based on Reudink and Antonio

Petitioner challenges claim 16 as obvious in view of Reudink and Antonio. Pet. 5, 27, 30–59.

1. Reudink (Ex. 1009)

Reudink is directed to “[s]ystems and methods adapted to optimize data throughput in wireless communications network.” Ex. 1009, code (57) (Abstract). “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.” *Id.*

Figure 2D of Reudink is reproduced below.

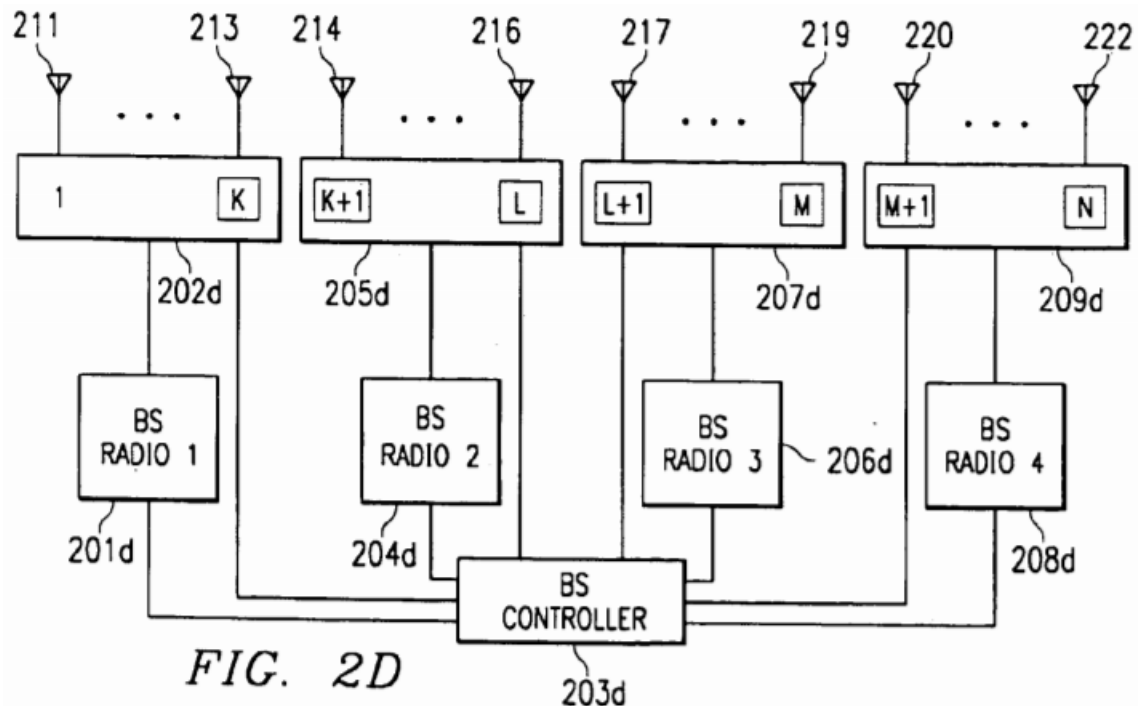


Figure 2D depicts four base station (BS) radio units (201d, 204d, 206d, 208d) coupled to antennas 211–222. *Id.* at 9:28–30. “[M]ultiple beams and multiple beam antennas as used herein include[] an adaptive array providing a single antenna radiation pattern at any one instant, as well as those providing multiple simultaneous antenna beams.” *Id.* at 7:12–16.

Figures 9 and 10 of Reudink are reproduced below.

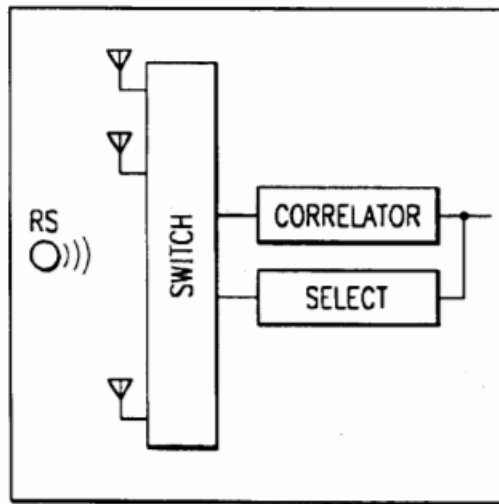


FIG. 9

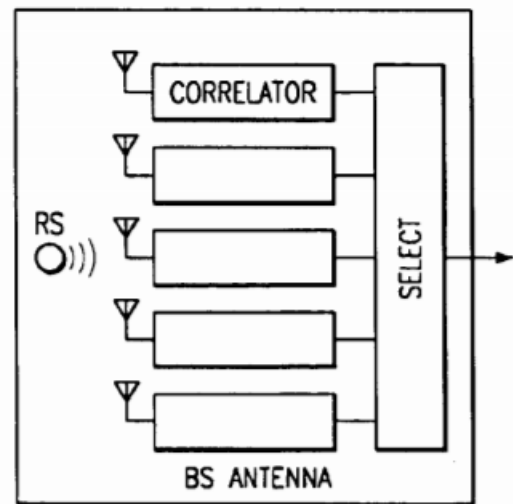


FIG. 10

Figures 9 and 10 depict “circuitry for the acquisition of most preferred antenna beams.” *Id.* at 6:33–34. In Figure 9, “correlation circuitry is provided which is coupled to the multiple antenna beams through a switch matrix, allowing antenna beams to be selectively provided to the correlator for determination of a most preferred antenna beam.” *Id.* at 11:30–34.

“Where determination of a most preferred antenna beam is more time critical, such as where ones of the RSs [remote stations] are likely to change position and/or where propagation conditions are subject to material change, the simultaneous acquisition circuitry of FIG. 10 may be more desired.” *Id.* at 11:36–40.

Reudink discloses a messaging protocol using a multiple beam antenna access channel (MBAACH). *Id.* at 11:44–13:26. In the first step, the base station (BS) sends a MBAACH message. *Id.* at 11:44–12:13. In the second step, the remote station (RS) makes signal strength measurements of MBAACH messages it receives and identifies which received MBAACH

message produces the strongest signal strength. *Id.* at 12:14–28. The RS then adjusts its antenna beam angle to the strongest BS and sends a reverse MBAACH message. *Id.* at 12:32–35 (“[T]he RS locks onto the best carrier, antenna beam, receive signal strength combination and transmits the reverse MBAACH to the appropriate BS.”). In the third step, the BS receives the reverse MBAACH message and responds with a direction message. *Id.* at 12:52–62. “The 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.

2. Antonio (Ex. 1010)

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.

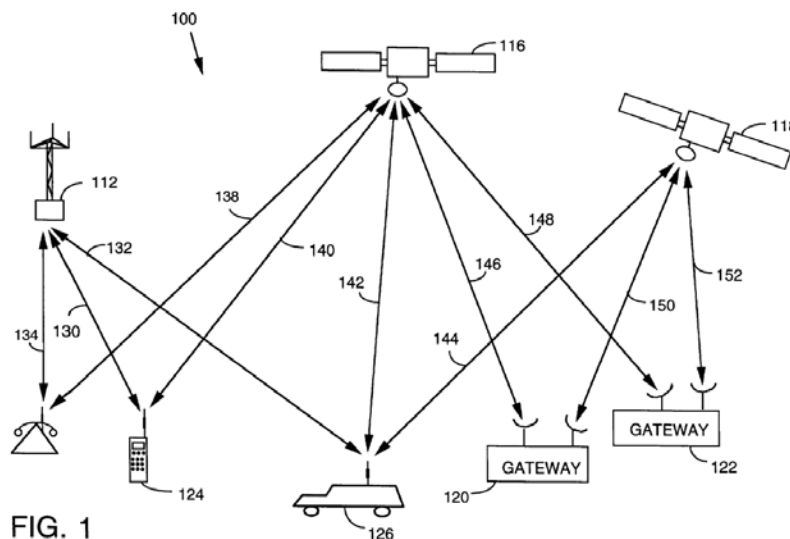


Figure 1 depicts a system 100 having base station 112, satellites 116 and 118, gateways 120 and 122, and user terminals 124, 126, and 128. *Id.* at 6:1–5. Base station 112 projects beams within a cell covering a predetermined service area on the Earth’s surface. *Id.* at 7:25–27. Each of

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. Claim 16

Petitioner contends that independent claim 16 would have been obvious in view of Reudink and Antonio. Pet. 5, 27, 30–59. Petitioner’s contentions with regard to the asserted combination of references teaching all the limitations of claim 16 and motivation to combine the relevant teachings of the cited references are detailed and well-supported. *Id.* As indicated above, Patent Owner directs all its argument towards a single claim limitation: “the access point configured to . . . determine from the uplink transmission if the receiving device should operatively associate with a different beam downlink transmission.” *See generally* PO Resp. A limitation-by-limitation analysis and analysis of the motivation to combine the relevant teachings of the cited art follows.

“A wireless communication system, comprising”

Petitioner asserts, “[i]f the preamble is limiting, Reudink discloses a wireless communication system.”⁶ Pet. 31. Reudink states, “[t]he invention relates to wireless communication systems.” Ex. 1009, 1:6. We find Reudink teaches a wireless communication system.

“a phased array antenna configured to transmit beam downlinks”

Petitioner cites Reudink as teaching this limitation. Pet. 32–33. Reudink states, “BS 101 is preferably adapted to direct energy into and out of any antenna beam on command.” Ex. 1009, 7:64–65. Reudink also states:

It should be appreciated that the multiple narrow antenna beams utilized according to the present invention may be provided by a multiple beam antenna array The antenna beams utilized according to the present invention may be formed from a fixed beam array (such as a Butler matrix switched beam array) or from adaptive array (such as an adaptive beam forming array using adjustable phase progressions and weighting to form antenna beams and nulls).

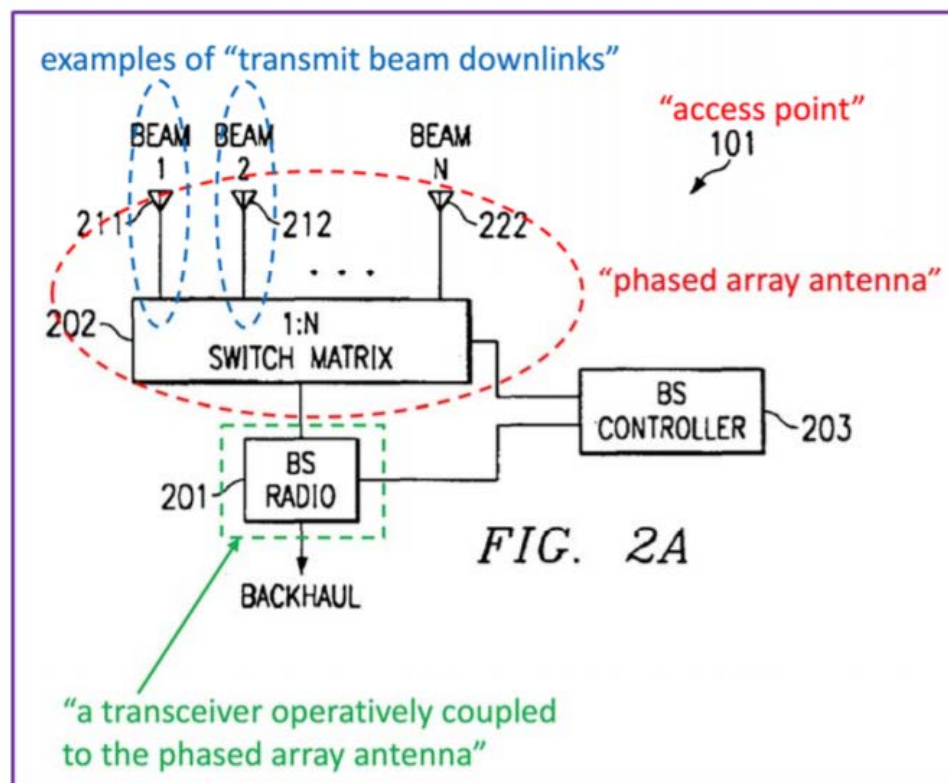
Id. at 8:1–13. Petitioner contends, “[t]he Butler matrix switched beam array and the adaptive array using ‘adjustable phase progressions and weightings

⁶ “[W]here a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention, the preamble is not a claim limitation.” *Rowe v. Dror*, 112 F.3d 473, 478 (Fed. Cir. 1997). The preamble of claim 16 is a statement of purpose or intended use and claim 16 otherwise appears to define a structurally complete invention. Thus, our initial determination is that the preamble of claim 16 is not limiting. However, we need not decide whether the preamble of claim 16 is limiting as we determine Petitioner establishes the cited art teaches a wireless communication system.

to form antenna beams and nulls' are both phased array antennas as they each are an array of antenna elements that transmits beams by changing the phases of the signals at the antenna elements." Pet. 33 (citing Ex. 1006 (Negus Decl.) ¶ 271). Petitioner's contention is supported by the cited evidence and Patent Owner does not argue to the contrary. We find Reudink teaches this limitation.

"a transceiver operatively coupled to the phased array antenna and configured to send and receive electromagnetic signals via the phased array antenna"

Petitioner relies on Reudink as teaching this limitation. Pet. 33–35. With regard to this limitation, Petitioner submits (Pet. 34) an annotated Figure 2A, reproduced below.



Annotated Figure 2A depicts, “base station 101 includ[ing] a base station radio 201 coupled to antennas 211–222 through a switch matrix 202, so as to direct energy between any of the antennas and the base station radio (and out of beams 1-N) on command.” Pet. 34 (citing Ex. 1006 (Negus Decl.) ¶ 283; Ex. 1009, 6:15–16, 7:66–67, 8:22–25). Petitioner contends, “[a] POSITA would understand that the base station radio (BS Radio) disclosed by Reudink is a transceiver, and it is operatively coupled to the phased array (discussed in [regard to immediately preceding “phased array antenna”] limitation []) as described by the coupling of the base station radio to the multi-beam antenna, and is configured to send and receive electromagnetic signals via the phased array antenna.” *Id.* at 34–35 (citing Ex. 1006 (Negus Decl.) ¶ 290). Petitioner’s contention is supported by the cited evidence and Patent Owner does not argue to the contrary. We find that Reudink teaches this limitation.

“an access point that includes the phased array antenna and the transceiver, the access point configured to”

Petitioner relies on Reudink as teaching this limitation. Pet. 35–36. Reudink discloses an access point (base station) that includes a phased array antenna and transceiver as discussed with regard to the two preceding limitations. We find Reudink teaches this limitation.

“selectively allow a receiving device to operatively associate with a beam downlink transmitted to the receiving device via the phased array antenna”

Petitioner relies on Reudink as teaching this limitation. Pet. 36–40. Reudink states:

[T]he 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. “Acquiring and identifying the most preferred antenna beam at the BS is preferably performed by the BS correlating the target RS on all antenna beams, or some subset thereof determined to be candidates for establishing communications with the target RS.” *Id.* at 11:18–22.

“Thereafter the RS preferably adjusts its antenna beam angle to the strongest BS and transmits in the time slot reverse link dedicated to MBA [multi-beam antenna] access channel (reverse MBAACH) information regarding the most preferred carrier and beam combination.” *Id.* at 12:28–32. “After having provided . . . the reverse MBAACH, the RS listens on a direction MBAACH portion of the channel, corresponding to the beam number used, for a . . . direction message” that “may instruct the RS that the identified best carrier, angle and beam is acceptable for communication.” *Id.* at 12:52–58.

Petitioner contends:

The base station transmitting the direction message via its antenna is the access point that allows a remote station, i.e., a receiving device, to operatively associate with a beam downlink transmitted to the receiving device via the phased array antenna by sending a direction message over a beam that tells the receiving device that the beam is acceptable for communication.

Pet. 39–40 (citing Ex. 1006 (Negus Decl.) ¶ 323). Petitioner’s contention is supported by the cited evidence and Patent Owner does not argue to the contrary. We find that Reudink teaches this limitation.

“receive an uplink transmission from the receiving device through the phased array antenna”

Petitioner relies on Reudink as teaching this limitation. Pet. 40–41. Petitioner contends the “reverse MBAACH” transmission discussed with regard to the immediately preceding limitation satisfies this limitation. *Id.* at 41 (citing Ex. 1006 (Negus Decl.) ¶ 350). Petitioner’s contention is supported by the cited evidence and Patent Owner does not argue to the contrary. We find that Reudink teaches this limitation.

“determine from the uplink transmission if the receiving device should operatively associate with a different beam downlink transmission”

Petitioner argues that Reudink discloses or renders obvious this limitation. See Pet. 42–47. This is the only limitation argued by Patent Owner.⁷ See PO Resp. 15–26. We agree with Petitioner that Reudink teaches or suggests this limitation.

⁷ We note that in connection with Petitioner’s Opposition to the Motion to Amend (see MTA Opp. 25), Patent Owner did not dispute that the cited art teaches the amended “determine” limitation. See *generally* MTA Reply. We also note that in IPR2018-00726 and IPR2018-00763, in which different combinations of references were asserted, Patent Owner did not dispute that the cited art taught the “determine” limitation of claim 16. See IPR2018-00726, Paper 38 (Final Dec.) at 20–23; IPR2018-00763, Paper 38 (Final Dec.) at 19–20 (relying principally on Antonio (also cited herein) as teaching the “determine” limitation). We further note that the combination of references asserted herein was found to teach a similar limitation (“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”) in claim 1 of a related patent (US Patent No. 7,062,296) in IPR2018-01017 wherein the parties made similar arguments and referred to similar evidence. IPR2018-01017, Paper 44 (Final Dec.) at 24–35.

Petitioner argues:

Reudink discloses this limitation because it discloses the base station determining if a remote station should switch to a different beam transmitted by the same multi-beam antenna based on determinations made from transmissions from remote stations, such as where the remote station has moved, propagation conditions have changed, or where other remote stations are causing inter-cell interference.

Pet. 46 (citing Ex. 1006 (Negus Decl.) ¶ 389). With regard to the argument that Reudink renders this limitation obvious, Petitioner argues:

Reudink's procedures for determining a preferred antenna beam identify these beams based on criteria such as signal strength, signal to noise ratio [SNR], or signal to interference ratio [SIR], 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 ¶ 393. The base station is also aware of the current beam for a given remote station. Ex. 1006 ¶ 394. 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 could cause determine that the remote station should switch to the preferred beam. Ex. 1006 ¶ 395. 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 ¶ 396.

Pet. 46–47. Patent Owner argues, “[t]he Petition shows only that Reudink discloses an ‘access point configured to . . . operatively associate [the receiving device] with a different beam,’ *not* an ‘access point configured to . . . *determine* from the uplink transmission *if* the receiving device should

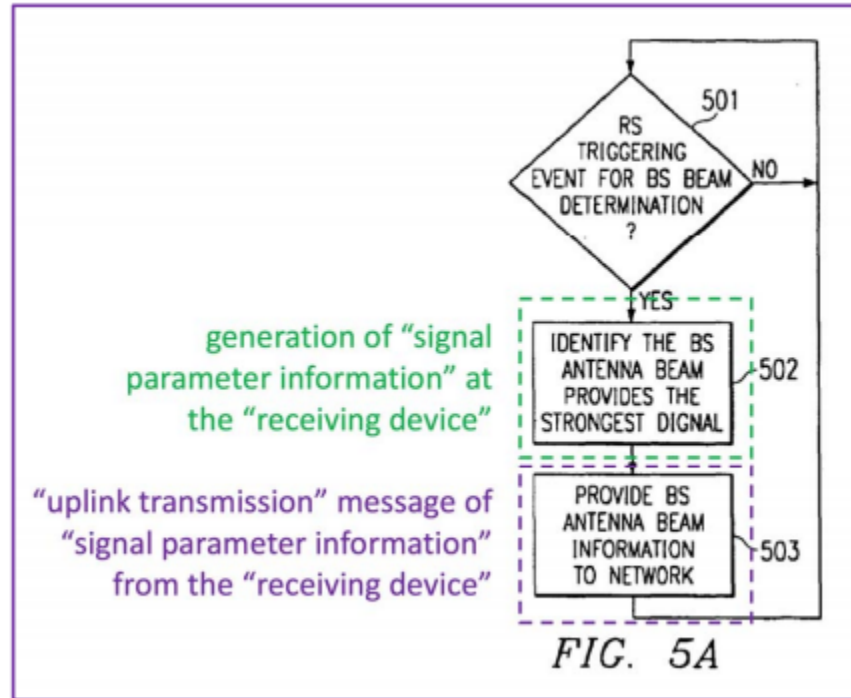
operatively associate with a different beam,’ as claim 16 actually requires.”
PO Resp. 15 (bracketed material in original).

Petitioner cites to teachings in Reudink, which are discussed below, to show Reudink teaches this limitation. See Pet. 42–47. In the Abstract, Reudink teaches, “[a] preferred embodiment is taught which provides for the initial and **subsequent** identification and use of a most preferred antenna beam for establishing communications.” Ex. 1009, code (57) (emphasis added). Reudink also teaches, “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 **provide the ability for RSs to change to different channels**, such as based on interference conditions.” *Id.* at 3:5–9 (emphasis added). Reudink teaches, “[t]he capacity of a particular cell is optimized according to a preferred embodiment of the present invention by considering signal quality measurements, such as signal to noise ratio (SNR) and/or signal to interference ratio (SIR), as well as a capacity needs for each RS in the cell.” *Id.* at 4:1–6. And, Reudink teaches:

Preferably, 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. Accordingly, the greatest number of uses/reuses of the spectrum may be used to provide optimization.

Id. at 4:51–57. With regard to Reudink determining which downlink beam to use based on uplink signals, Reudink teaches, “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 the N fixed beams for downlink transmission.” *Id.* at 7:24–27,

Petitioner also relies on Figure 5 of Reudink which “shows flow diagrams of the identification of antenna beams for communication at remote stations and at base stations.” *Id.* at 6:20–22. Petitioner provides an annotated Figure 5A, which is reproduced below.



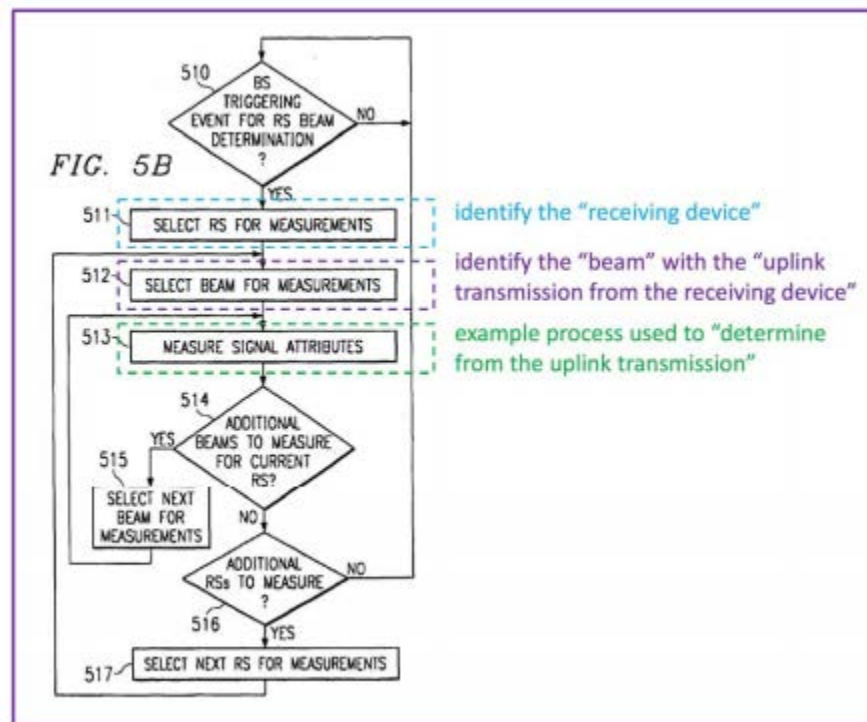
Annotated Figure 5A depicts “generation of ‘signal parameter information’ at the ‘receiving device’” (step 502: “identify the BS antenna beam [which] provides the strongest signal [sic]”) and “‘uplink transmission’ message of ‘signal parameter information’ from the ‘receiving device’” (step 503: “provide BS antenna beam information to network”). *See* Pet. 44. Petitioner’s contentions in this regard are supported by the detailed description of Figure 5A. *See* Ex. 1009, 16:3–61. With regard to the “RS triggering event for BS beam determination” at step 501, Reudink provides:

Directing attention to FIG. 5A, an algorithm operable to cause RSs to ***periodically*** identify and provide BS antenna beam selection information to the network is shown. This algorithm is preferably operable on a processor based system of the RS and

provides control of the RS to identify the desired antenna beam information and provide this information to a corresponding network system, such as the aforementioned BS or network controller. Specifically, at step 501 a determination is made as to whether an antenna beam determination event has occurred. This event may be a predetermined time period, a threshold amount of data communication having been accomplished, a threshold data error rate (such as a bit error rate (BER)), a predetermined signal quality level not having been maintained, or the like. If the triggering event has not transpired, then processing loops back to step 501 to forego antenna beam determination processing until the event has transpired.

Id. at 16:3–19 (emphases added).

Petitioner also provides an annotated Figure 5B which is reproduced below.



Annotated Figure 5B depicts an "example process used to 'determine [signal attributes] from the uplink transmission'" at step 513. Pet. 45. With regard to Figure 5B, Reudink states:

Directing attention to FIG. 5B, an algorithm operable to cause BSs to **periodically** measure signal attributes associated with RSs in communication therewith (or which communication therewith is possible) is shown. This algorithm is preferably operable on a processor based system of the BS, such as the above BS controller. **The information measured may be retained by the BS** and/or provided to other network systems if desired.

At step 510 a determination is made as to whether a triggering event has transpired for the determining of RS beam information. This event may be a predetermined time period, a threshold amount of data communication having been accomplished, a threshold data error rate (such as a BER), a predetermined signal quality level not having been maintained, or the like. **If the triggering event has not transpired, then processing loops back to step 510 to forego further antenna beam determination processing until the event has transpired.**

Ex. 1009, 16:62–17:2 (emphases added).

Petitioner contends:

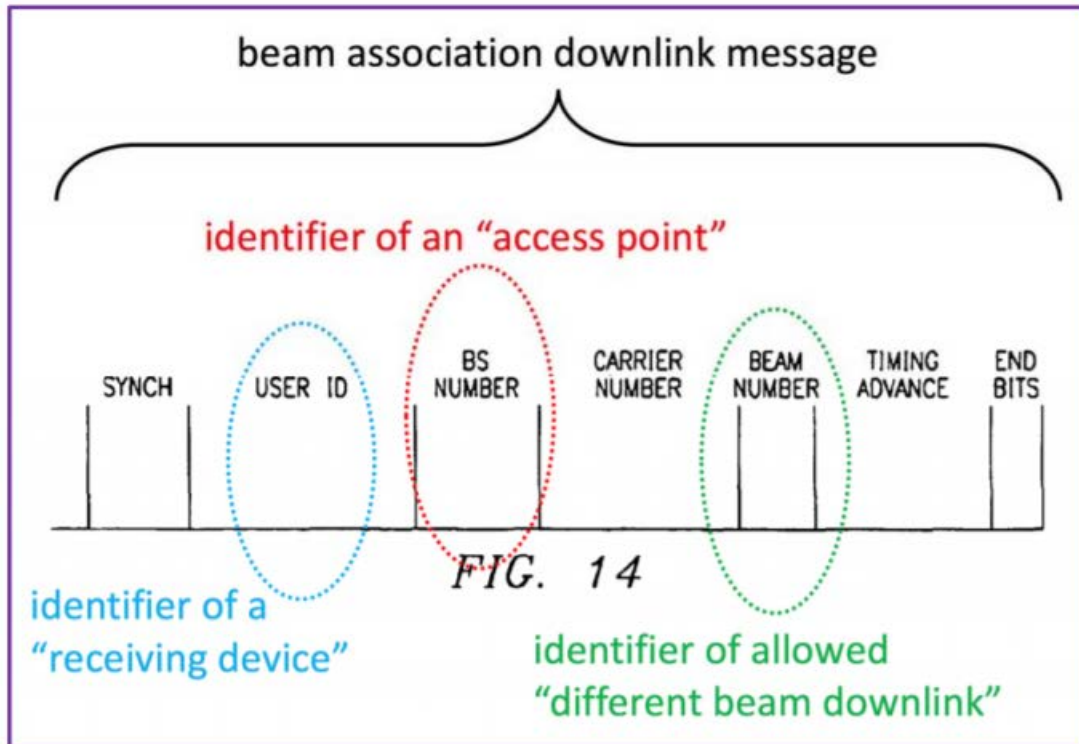
Thus, Reudink discloses this limitation because it discloses the base station determining if a remote station should switch to a different beam transmitted by the same multi-beam antenna based on determinations made from transmissions from remote stations, such as where the remote station has moved, propagation conditions have changed, or where other remote stations are causing inter-cell interference.

Pet. 46 (citing Ex. 1006 (Negus Decl.) ¶ 389). We agree. Considering the teachings of Reudink cited in the Petition, we determine that Reudink discloses an access point configured to determine from the uplink transmission if the receiving device should operatively associate with a different beam.

Accordingly, we find, by a preponderance of evidence, that Reudink teaches this limitation.

“and at least one of: allow the receiving device to operatively associate with the different beam downlink if determined that the receiving device should operatively associate with the different beam downlink; force the receiving device to operatively associate with the different beam downlink if determined that the receiving device should be operatively associated with the different beam downlink”

Petitioner relies on a combination of Reudink and Antonio as teaching this limitation. Pet. 47–54. In addition to those teachings from Reudink identified in connection with the immediately preceding limitation, Reudink states, “[a] difficulty in using multiple beam antennas is in the initial assignment and **subsequent tracking of** the best serving base station and the **most preferred antenna** beam associated therewith.” Ex. 1009, 11:1–4 (emphases added). The Petition states, “Reudink addresses this by having the base station periodically correlate signal data for a remote station on all antenna beams and then using the control channel MBAACH to send direction messages to the remote station identifying the best carrier, angle, and beam to use for communication.” Pet. 48 (citing Ex. 1006 (Negus Decl.) ¶¶ 404–407; Ex. 1009, 11:1–4, 11:18–22, 12:52–61, 12:65–13:9). Petitioner also provides (Pet. 48) an annotated Figure 14 of Reudink, reproduced below.



Annotated Figure 14 depicts a “beam association downlink message” which includes an “identifier of an ‘access point,’” “identifier of a ‘receiving device,’” and “identifier of allowed ‘different beam downlink.’” Petitioner contends:

Reudink at least discloses an access point (the base station) configured to allow the receiving device (the remote station) to operatively associate with the different beam downlink (like when the base station sends the MBAACH direction message to the remote station if the remote station is permitted to establish communication via that beam) if the remote station should operate with a different beam downlink.

Pet. 48–49 (citing Ex. 1006 (Negus Decl.) ¶ 415).

With regard to Antonio, the Petition states, “[t]o the extent that Reudink does not disclose th[is] limitation[], Anto[n]io does disclose this limitation” and “Antonio discloses a complimentary method of transmitting control messages from a base station (i.e. an access point) to a user terminal

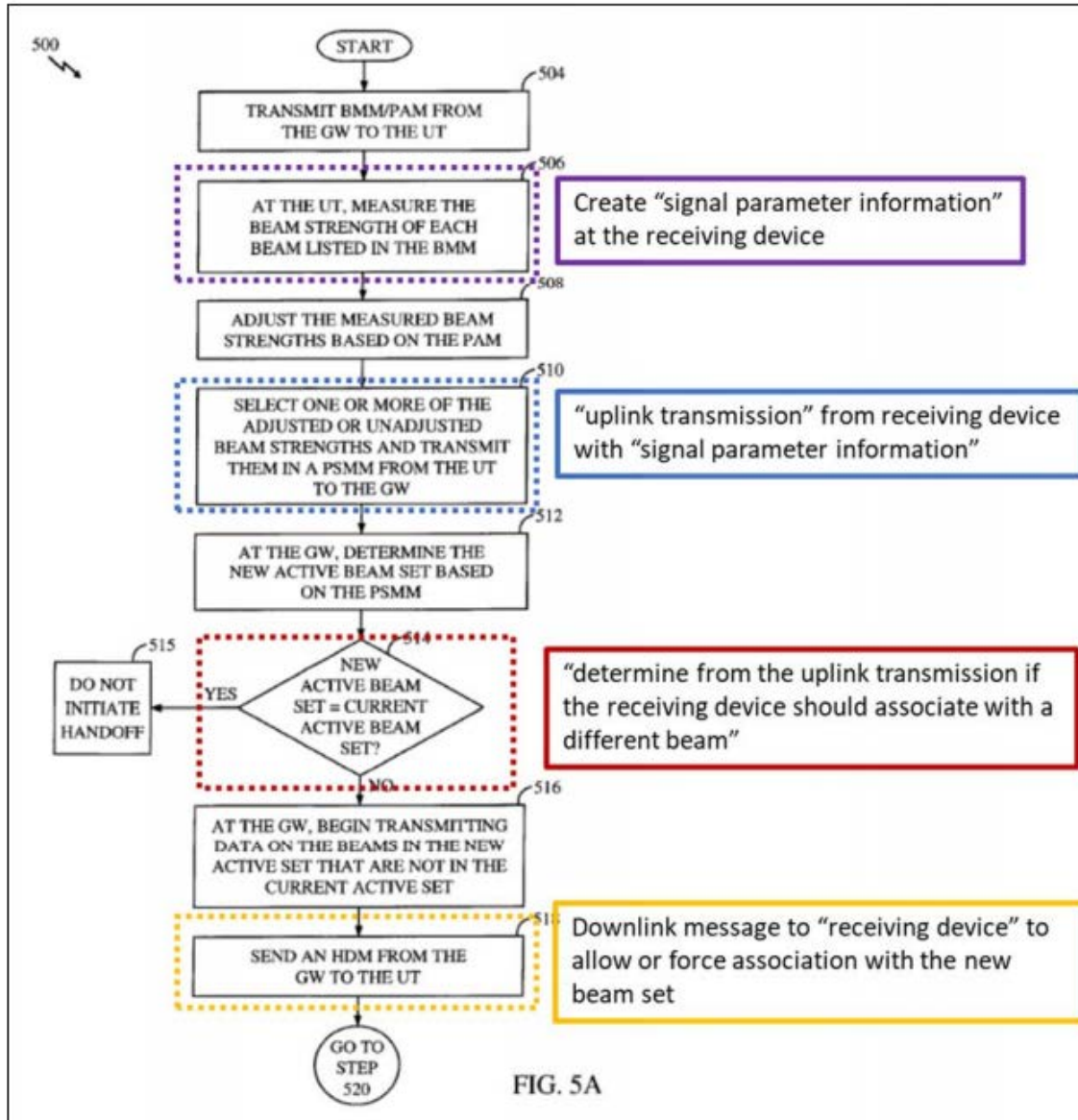
(i.e. a receiving device) that is similar to the MBAACH disclosed in Reudink.” Pet. 49. Antonio states:

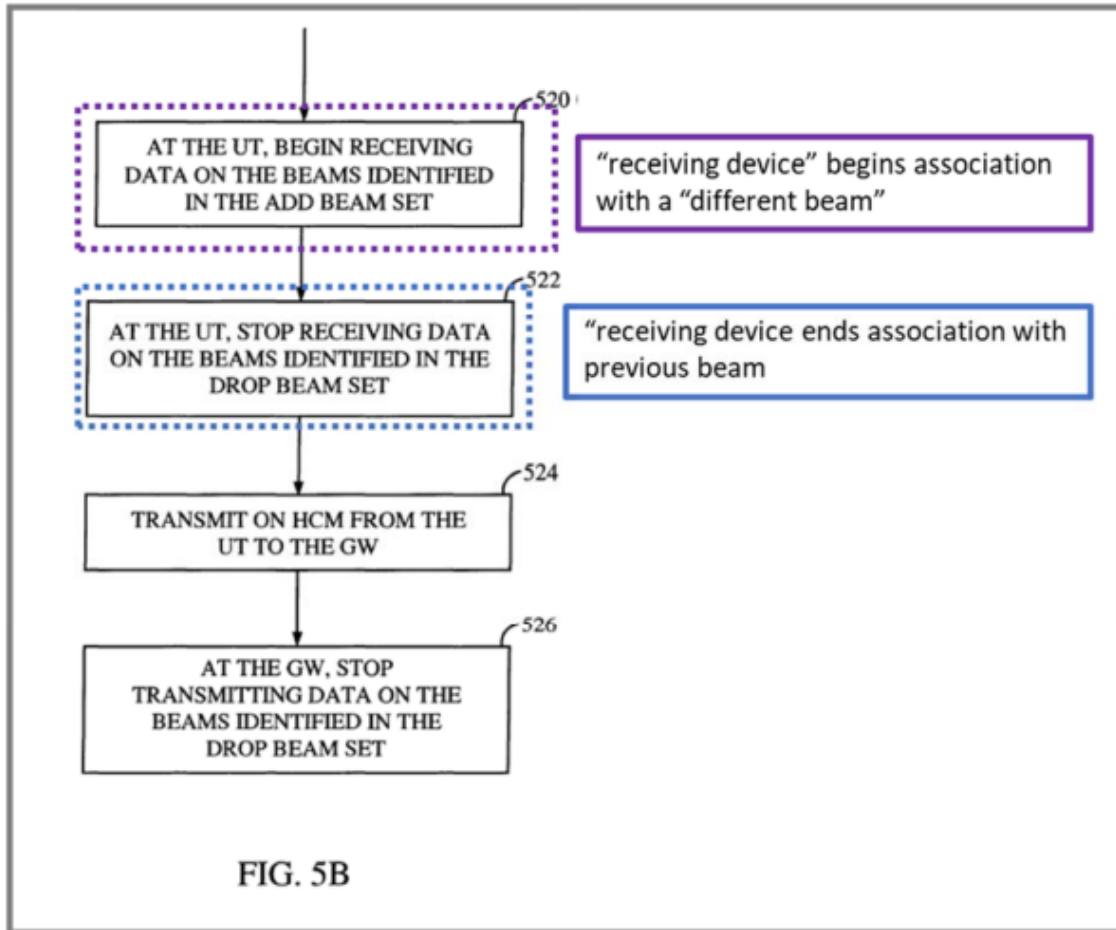
The method according to one embodiment of the present invention includes the steps of: (1) transmitting from the communication station to the user terminal a Beam Mask Message (BMM) containing a plurality of beam identifiers, where each of the beam identifiers identifies a beam currently available to the communication station; (2) periodically measuring at the user terminal a strength of each beam identified in the BMM; (3) periodically transmitting from the user terminal to the communication station a Pilot Strength Measurement Message (PSMM) containing a plurality of beam strength values, where each such beam strength value is a function of the measured strength of one of the beams identified in the BMM; (4) based on the beam strength values in the PSMM, selecting at the communication station one or more beams that should be used as a communication link between the communication station and the user terminal (i.e., ***the communication station selects a new active beam set***); (5) at the communication station, transmitting information on all of the beams in the new active beam set; (6) ***transmitting from the communication station to the user terminal a Handoff Direction Message (HDM) if the one or more beams selected in step (4) are not the same one or more beams that are in the current active beam set***, where the current active beam set consists of the one or more beams on which a communication link between the communication station and the user terminal is already established; and (7) receiving at the communication station a Handoff Completion Message (HCM) transmitted from the user terminal after the user terminal receives information on each of the beams in the new active beam set.

Based on the HDM, the user terminal can determine the one or more beams that the communication station selected in step (4) that should be used as a communication link between the communication station and the user terminal. In one embodiment, the HDM includes a beam identifier corresponding to each beam selected by the communication station in step (4). In another embodiment, ***the HDM includes an add beam set and a drop beam set. The add beam set includes a beam identifier***

for each beam within the new active beam set that is not in the current active beam set. The drop beam set includes a beam identifier for each beam in the current active beam set that is not in the new active beam set.

Ex. 1010, 3:13–55 (emphases added). Petitioner provides (Pet. 51–52) annotated Figures 5A and 5B from Antonio, reproduced below.





Annotated Figures 5A and 5B depict a beam handoff procedure in accordance with the description set forth above. Petitioner contends:

Thus, Antonio discloses determining an access point (a base station) configured to allow a receiving device (a user terminal) to operatively associate with the different beam downlink (such as when the base station sends an HCM to the user terminal with an add beam set identifying a different active beam that the user terminal must use to communicate with the base station) if the access point determines that the receiving station should associate with a different beam downlink (if the new active beam set does not equal the current active beam set). Antonio also discloses forcing the receiving device to operatively associate with a different beam downlink by having the base station send an HCM to the user terminal with a drop beam set that includes the beam the user terminal is using to

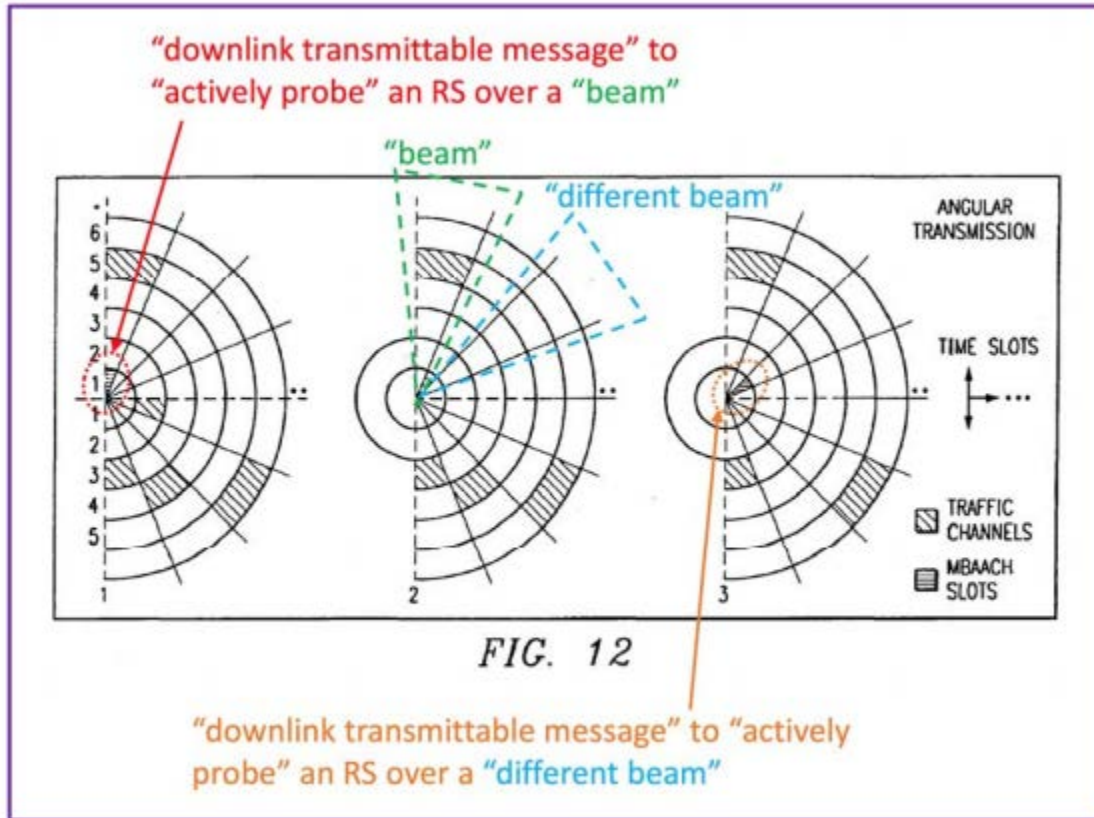
communicate, if the access point determines that the receiving device should associate with a different beam downlink.

Pet. 52–53 (citing Ex. 1006 (Negus Decl.) ¶ 435). Petitioner’s contentions with regard to this limitation are supported by the cited evidence. Patent Owner does not argue that the cited art fails to teach this limitation. *See generally* PO Resp. We find that the combination of Reudink and Antonio teaches this limitation.

*“wherein the access point is further configured to actively probe the receiving device by generating a signal to initiate that the phased array antenna transmit at least one downlink transmittable message over the beam downlinks, and”*⁸

Petitioner relies on Reudink as teaching this limitation. Pet. 54–57. Specifically, Petitioner relies on the transmission by the base station of a “forward link MBAACH message” to a remote station as described in Reudink at column 11, line 44, through column 12, line 32, as teaching “actively probing” as recited in claim 16. *Id.* Petitioner also provides an annotated Figure 12 of Reudink (Pet. 56), reproduced below.

⁸ Petitioner parses the last limitation of claim 16 into two parts. *See* Pet. 54, 57. We have adopted Petitioner’s parsing in order that our analysis follows Petitioner’s presentation.



Annotated Figure 12 depicts an antenna of a base station transmitting a “downlink transmittable message” to “actively probe” an RS over two different beams. Petitioner contends, “Reudink discloses actively probing a receiving device (a remote station) by generating a signal to initiate that the phased array antenna (part of the base station) transmit at least one downlink transmittable message over the beam downlinks (the forward link MBAACH messages sent across all beams to a receiving device). Pet. 57. Petitioner’s contention is supported by the cited evidence and Patent Owner does not argue to the contrary. We find that Reudink teaches this limitation.

“gather signal parameter information from uplink transmittable messages received from the receiving device through the phased array antenna”

Petitioner relies on Reudink as teaching this limitation. Pet. 57–59. Specifically, Petitioner relies on the “reverse MBAACH” messages transmitted by a remote station (RS) to the base station (BS) as teaching the “uplink transmittable messages” as recited in claim 16. *Id.* Reudink teaches that the “reverse MBAACH data . . . includes a . . . report message” and that “[t]he report message provides information such as carriers detected, angles and beam numbers above threshold, etcetera [sic].” Ex. 1009, 12:37–40, 12:49–51. Reudink also teaches, “a communication path may be set up so that from time to time each RS logs onto the network and identifies what BS and what beam provides the strongest signal thereto.” *Id.* at 15:58–61.

Petitioner contends:

Thus, Reudink discloses an access point (the base station) further configured to gather signal parameter information (such as carrier and beam numbers that produce the strongest receive signal strength, carriers detected, angles, beam numbers above threshold) from uplink transmittable messages received from the receiving device (such as the reverse MBAACH messages sent periodically from each of multiple remote stations) through the phased array antenna (which the base station’s Multi-Beam Antenna).

Pet. 59. Petitioner’s contention is supported by the cited evidence and Patent Owner does not argue to the contrary. We find that Reudink teaches this limitation.

Motivation to Combine the Cited Art

Petitioner contends a person of ordinary skill in the art would have been motivated to combine the relevant teachings of Reudink and Antonio to make beam acquisition by mobile devices faster and to reduce signal loading on the network. Pet. 24–27 (citing Ex. 1006 (Negus Decl.) ¶ 451). The Petition states:

A POSITA at the time of Reudink and Antonio would have been motivated to combine the teachings of Reudink and Antonio. Reudink sends a direction message to remote stations indicating if a beam is acceptable for communication and, if not, that the remote station should search for another beam. Acquiring a beam can thus take some time and may be a problem in cases where beam acquisition is time critical, such as for a mobile remote station. Modifying the direction message of Reudink to include the “add beam set” and “drop beam set” from Antonio’s HDM would speed up beam handoffs for mobile users in the Reudink wireless system and also reduce signaling load on the network. Ex. 1006 ¶ 451. Making this combination is within the ordinary creativity and routine skill of a POSITA because Reudink and Antonio are both directed to problems associated with determining and communicating the preferred beams to be used to establish communications between a remote station and a base station in a wireless multi-beam communication system. Ex. 1006 ¶ 439. Both Reudink and Antonio consider multi-beam communication systems applicable to wireless communications, with both fixed and mobile remote stations. Ex. 1006 ¶ 440.

Pet. 24–25. We agree that a person of ordinary skill in the art would have been motivated to combine the relevant teachings of Reudink and Antonio to make beam acquisition by mobile devices faster and to reduce signal loading on the network. In its Response, Patent Owner does not dispute Petitioner’s showing with regard to motivation to combine the relevant teachings of Reudink and Antonio. *See generally* PO Resp. We find the Petition

contains reasonable and well-supported rationale showing the existence of a motivation to combine the relevant teachings of Reudink and Antonio.

Conclusion regarding Unpatentability of Claim 16

After consideration of the arguments and evidence presented by the parties, we find that a preponderance of the evidence establishes Reudink and Antonio teach all the limitations of claim 16 and that Petitioner has established there was a motivation to combine the relevant teachings of Reudink and Antonio. We conclude that claim 16 would have been obvious in light of Reudink and Antonio.

E. Patent Owner's Contingent Motion to Amend

Patent Owner moves that “[i]n the event that the Board finds original claim 16 unpatentable, [Patent Owner] respectfully requests that the Board grant this motion to amend with respect to the corresponding substitute claim 18.”⁹ Mot. to Amd. 1. As we find original claim 16 unpatentable, we address Patent Owner's Motion to Amend. For the reasons that follow, the Motion to Amend 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) and 37 C.F.R. § 42.121. *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 (PTAB Feb. 25, 2019) (precedential). 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

⁹ Patent Owner further indicated that its Motion to Amend was contingent upon a determination that its proposed substitute claim in IPR2018-00763 was unpatentable. MTA Reply 1. This contingency was also met as the proposed substitute claim in IPR2018-00763 was determined to be unpatentable. See IPR2018-00763, Paper 38, 32–50.

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.¹⁰ See 35 U.S.C. § 316(d); 37 C.F.R. § 42.121; *see also* *Lectrosonics, Inc.*, Paper 15 at 4–8. With regard to these requirements, the dispute between the parties relates only to whether substitute claim 18 is supported by the disclosure of the ’728 patent. *See generally* MTA Opp. and MTA Reply.

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, Inc.*, Paper 15 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 ordinarily will lie with the petitioner to show that any proposed substitute claims are unpatentable by a preponderance of the evidence.” *Lectrosonics, Inc.*, Paper 15 at 4.

For the reasons explained below, we conclude that proposed substitute claim 18 does not have written description support in the Specification of the

¹⁰ Petitioner correctly argues that Patent Owner does not cite to the original disclosure of the ’728 patent. MTA Opp. 4. In response, Patent Owner states, “Where, as here, the patent’s specification is identical to the original application, § 42.121(b) is met by citations to the specification.” MTA Reply 2–3. Petitioner identifies no differences between the original application as filed and the Specification of the issued ’728 patent. We agree with Petitioner that Patent Owner should have cited to the original disclosure of the patent, but we do not reach this issue as we believe it is better to decide the Motion to Amend on the merits rather than a procedural issue.

'728 patent. We also conclude proposed substitute claim 18 would have been obvious.

1. Proposed Substitute Claim 18

Proposed substitute claim 18 is set forth below with additions to claim 16 underlined and the deletion shown in strikethrough:

18. (Substitute for claim 16, if found unpatentable) A wireless communication system compliant with IEEE 802.11 standards, comprising:

a phased array antenna configured to transmit beam downlinks;

a transceiver operatively coupled to the phased array antenna and configured to send and receive electromagnetic signals via the phased array antenna; and

an access point compliant with IEEE 802.11 standards that includes the phased array antenna and the transceiver, the access point configured to:

selectively allow a receiving device to operatively associate with a beam downlink transmitted to the receiving device via the phased array antenna;

transmit a number of downlink transmittable messages comprising a null-data frame to a receiving device compliant with IEEE 802.11 standards through the phased array antenna;

receive ~~a~~ a number of uplink transmissions, sent from the receiving device through the phased array antenna, each of said number of uplink transmittable messages being sent by said receiving device as a result of a transmission of different one of said number of downlink transmittable messages, and wherein the number of said downlink transmittable messages comprising a null-data frame is at least two, and is equal

to or greater than the number of said uplink transmittable messages;

determine from at least one of the number of uplink transmissions if the receiving device should operatively associate with a different beam downlink transmission, wherein the determination is based at least in part on an angular parameter; and

at least one of: allow the receiving device to operatively associate with the different beam downlink if determined that the receiving device should operatively associate with the different beam downlink; force the receiving device to operatively associate with the different beam downlink if determined that the receiving device should be operatively associated with the different beam downlink;

wherein the access point is further configured to actively probe the receiving device by generating a signal to initiate that the phased array antenna transmit at least one downlink transmittable message over the beam downlinks, and gather signal parameter information from uplink transmittable messages received from the receiving device through the phased array antenna.

Mot. to Amd. i–ii (Claims App.).

2. Written Description

A motion to amend 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). 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 that 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).

We determine that there is no written description support for the proposed amendment “an access point ***compliant with IEEE 802.11 standards***.” In the Motion to Amend, Patent Owner cites column 4, lines 38 through 44, of the ’728 patent in support of this amendment. See Mot. to Amd. 7.¹¹ The cited passage in the ’728 patent states: “the examples presented herein are directed towards wireless IEE[E] 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, 4:38–44 (emphasis added). This passage relates to the capability and configuration of the client device not the access point. See Ex. 2006 (Short Decl.) ¶ 40 (citing this same passage in support of the statement that “a [POSITA] would understand that the ***receiving device*** can be 802.11 ***compatible***.”) (emphases added).

¹¹ In this section of the Motion to Amend, Patent Owner does not even clearly assert that the Specification of the ’728 patent provides written description support for this amendment. See Mot. to Amd. 7 (“[T]he access point ***may be*** compliant with 802.11 standards.”) (emphasis added). The declaration of Patent Owner’s technical witness, Dr. Short, filed in support of the motion to amend provides nothing more than a verbatim recitation of this sentence and a citation to same passage in the ’728 patent with no reasoning or explanation. See Ex. 2006 ¶ 36. As the cited passage does not support his statement, we give no weight to this portion of Dr. Short’s declaration. See 37 C.F.R. § 42.65(a). And, we find that Patent Owner’s ambiguous assertion lacks evidentiary support.

There are other passages in the Specification of the '728 patent that mention IEEE 802.11. The “Background” section of the '728 patent states, “[c]urrently, a very popular form of wireless communication includes the IEEE 802.11 family of protocols/standards.” Ex. 1001, 2:10–12. We do not find any written description support for making “an access point compliant with IEEE 802.11 standards” in this passage or elsewhere in the “Background.”¹²

The '728 patent also states, “[i]n certain implementations, 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.” *Id.* at 6:3–7. As shown in Figure 1 (reproduced above) and stated previously in this paragraph of the Specification, communication logic 118 is in the client device not the access point. *See id.* at 5:66–67 (“client device 104 includes communication logic 118”). And as Petitioner points out, this passage, “does not refer to ‘compliance’ with the standard, as opposed to being able to merely establish a ‘communication link.’” MTA Opp. 6. We do not find any written description support for “an access point compliant with IEEE 802.11 standards” in this passage.

The '728 patent further states:

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

¹² The “Background” concludes by stating, “there is a need for methods and apparatuses that will effectively cause a **receiving device** to switch beam association within a smart antenna based wireless communication system at selected times.” Ex. 1001, 2:47–50 (emphasis added).

point 102 and possibly access point 108 need to be altered or modified.

Id. at 8:22–27 (emphasis added). This is the only passage in the ’728 patent that references IEEE 802.11 and uses the term “compliant.” However, it refers only to “IEEE 802.11 family compliant **client devices**,” not access points. *Id.* In addition, this passage states that “IEEE 802.11 family compliant client devices need not be changed or altered to work with the methods and apparatuses described herein.” *Id.* at 8:23–25. With regard to access points, it states, “for these types of systems, only access point 102 and possibly access point 108 need to be altered or modified.” *Id.* at 8:25–27. Taken together, these passages provide that IEEE 802.11 compliant client devices need not be changed or modified to work with the methods and devices described in the ’728 patent but that for these type of systems, i.e., IEEE 802.11 family compliant systems, access point devices need to be, or possibly need to be, altered or modified. Petitioner argues:

Indeed, the specification touts that the “client device” can remain “compliant” with 802.11, whereas only the “access point . . . need[s] to be altered or modified.” Ex-1004: 8:22-27. [Patent Owner]’s only citation to the term “compliance” is 8:22-25, but that excerpt teaches modifying the access point with which a client communicates, undermining [Patent Owner]’s position.

MTA Opp. 6. We do not find any written description support for “an access point compliant with IEEE 802.11 standards” in this passage.

We conclude that, at least with regard to the proposed “an access point compliant with IEEE 802.11 standard,” the Specification of the ’728 patent does not provide written description support. As there must be written description support for all the proposed claim changes, we deny the Motion to Amend for this reason.

3. *Obviousness*

Petitioner argues that “Substitute Claim 18 Is Obvious over Reudink (Ex-1009) in View of Antonio (Ex-1010) and IEEE 802.11-1999 (Ex-1019).” MTA Opp. 11.

a. *IEEE 802.11-1999 (Ex. 1019)*

IEEE 802.11-1999 was published in 1999. Ex. 1019, iii. Patent Owner does not argue that IEEE 802.11-1999 is not prior art. See MTA Reply 10–12. We find that IEEE 802.11-1999 is prior art to the ’728 patent.

IEEE 802.11-1999 states:

This standard defines the protocol and compatible interconnection of data communication equipment via the “air”, radio or infrared, in a local area network (LAN) using the carrier sense multiple access protocol with collision avoidance (CSMA/CA) medium sharing mechanism. The medium access control (MAC) supports operation under control of an access point as well as between independent stations. The protocol includes authentication, association, and reassociation services, an optional encryption/decryption procedure, power management to reduce power consumption in mobile stations, and a point coordination function for time-bounded transfer of data.

Id. at vi.

We also note that the ’728 patent describes “the IEEE 802.11 family of protocol/standards” as “very popular” (Ex. 1001, 2:10–12); “an association process that establishes a communication link under IEEE 802.11(a), IEEE 802.11(b), IEEE 802.11(g), etc.” as “well known” (*id.* at 6:4–6, 23); and “IEEE 802.11 family compliant client devices” as

“conventional” (*id.* at 8:23–24). Thus, IEEE 802.11 standards, protocols, and client devices are acknowledged to be prior art in the ’728 patent.¹³

b. Analysis

With regard to substitute claim 18, both parties rely on their respective presentations with regard to claim 16 especially as relating to the limitations present in original claim 16. *See* MTA Opp. 11 (“The following analysis augments the analysis of record in this trial.”); MTA Reply 10–12 (non-obviousness arguments limited to combining the teachings of IEEE 802.11-1999 with the teachings of Reudink). Petitioner establishes that each of the limitations recited in claim 18 is taught by the cited art and that there existed a motivation to combine the relevant teachings of the cited references with a reasonable expectation of success. *See* MTA Opp. 11–25. We conclude that proposed substitute claim 18 is unpatentable. As the arguments and evidence presented by the parties with regard to claim 18 are largely limited to the new limitations in claim 18, our analysis provided below is similarly focused although our obviousness conclusion is based on consideration of the claim as a whole.

“compliant with IEEE 802.11 standards”

Petitioner argues:

[I]t would have been obvious to implement Reudink and Antonio’s beam management teachings in the 802.11 environment because a POSA would have been motivated to take

¹³ In arguing that the phrase “compliant with IEEE 802.11 standards” is not indefinite, Patent Owner states, “Petitioners also argue that the specification does not expressly define **802.11 ‘compliance.’** But ‘a patent need not teach and preferably omits, what is **well known in the art.**’” MTA Reply 7 (emphases added).

advantage of the growing market popularity of the 802.11 standards and to combine the benefits of ‘space division multiple access’ (SDMA) with the benefits of 802.11, as others were already doing.

MTA Opp. 11–12 (citing Ex. 1020 (Negus Decl.) ¶¶ 109, 126–127).

Petitioner’s showing as to why and how it would have been obvious to make the system, access point, and receiving device of Reudink compliant with IEEE 802.11 standards is detailed and well-supported. *Id.* at 11–20. Dr. Negus, Petitioner’s technical witness, testified:

Reudink teaches improvements for frequency reuse by using multiple antenna beams (see, for example, Ex. 1009 at 6:51-65), and in my opinion, a POSITA would understand that using these narrow beams would similarly improve the capacity of a wireless local area networking system based upon IEEE 802.11-1999. This is because multiple antenna beams permit maintaining multiple parallel communications across space for otherwise shared time and frequency resources, a concept commonly known to a POSITA at the time of the alleged invention of the ‘728 Patent as “space division multiple access”, or SDMA. In my opinion, a POSITA would understand that implementing SDMA, such as the multibeam technology of Reudink, in combination with IEEE 802.11-1999 had self-evident and known benefits including significantly increasing communication capacity wireless local area networking systems based upon IEEE 802.11-1999.

A POSITA would further know that others in the field had recognized and disclosed implementing SDMA in combination with IEEE 802.11-1999 (see, for example, Ex. 1021 at 1:6-12, Ex. 1018 at 1:19-37, 1:54-64, 12:16-29, Ex. 1027 at 2:18-27).

Also, by the time of the alleged invention of the ‘728 Patent, a POSITA would know that others had taught the benefits of specifically amending the IEEE 802.11-1999 standard to include explicit support for SDMA-based technologies (see, for example, Ex. 1025 at slide 12, Ex. 1026 at slides 4-5).

Ex. 1020 ¶¶ 126–128. Patent Owner fails to specifically address or contradict this testimony and we find it is supported by the cited references and persuasive.

With regard to the motivation to combine, Petitioner states:

It would have been obvious to combine the system of Reudink with 802.11- 1999 at the time of the '728 Patent, given the state of the art and market forces. [Ex. 1020] ¶¶ 120-121. A POSA would know that 802.11 was the most widespread protocol for wireless networks in 2002, and was expected to grow. Ex-1023: 1-2; Ex-1020 ¶120. By the end of 2001, over 3 million 802.11 components were sold every quarter and over 23 million units were expected to ship annually by 2005. Ex-1023: 1; Ex-1024: 1. A POSA would thus be aware that 802.11 was of special interest in the field of wireless communications because it was so widespread at the time of the '728 Patent. Ex-1020 ¶120. Further, market forces would have provided an incentive for a POSA to combine Reudink with 802.11-1999 because 802.11 was so widely used and both are from the same field of wireless system art. Id., ¶121. Indeed, the background of the '728 Patent admits “Currently, a very popular form of wireless communication includes the IEEE 802.11 family of protocols/standards.” Ex-1004: 2:10-11.

* * *

A POSA would thus be highly motivated to implement Reudink's wireless communication system, base station (BS), and remote station (RS) in an 802.11-1999-based system to obtain numerous predictable and beneficial results, including reducing costs through using unlicensed spectrum, interoperability with millions of existing devices, and high throughput. [Ex. 1020] ¶125.

MTA Opp. 15–16. We agree with Petitioner. We find that the cited art teaches “[a] wireless communication system compliant with IEEE 802.11 standards,” “an access point compliant with IEEE 802.11 standards,” “a

receiving device compliant with IEEE 802.11 standards” as recited in claim 18 and that a motivation to combine the relevant teachings of Reudink, Antonio, and IEEE 802.11-1999 with a reasonable expectation of success existed.

“transmit a number of downlink transmittable messages comprising a null-data frame to a receiving device compliant with IEEE 802.11 standards through the phased array antenna”

Petitioner contends “Reudink and IEEE 802.11-1999 Handbook render this limitation obvious.” MTA Opp. 20. The ’728 patent describes a “null-data frame” as a “frame type Data, sub-type Null function.” Ex. 1004, 10:25–26. IEEE 802.11-1991 teaches the use of a “Data” frame type, subtype “Null function (no data)” as well as three additional “Data” frame subtypes with “no data.” Ex. 1019, 36; see MTA Opp. 21 (“[W]hile 802.11 specifies that ‘data’ frames can transport data, certain ‘data’ frame subtypes do not transport data, including: ‘Null function’ (example in the ’728 Patent), ‘CF-Ack (no data)’, ‘CF-Poll (no data)’, and ‘CF-Ack+CF-Poll (no data)’.”). Petitioner argues:

As discussed in the Petition, the forward MBAACH messages of Reudink are the downlink messages transmitted to the receiving device through the phased array antenna (Pet. 54-57) and sent “sequentially across all antenna beams for a channel” (*id.* at 56). It would have been obvious to a POSA to implement the forward MBAACH as a null-data frame because forward MBAACH messages do not contain data and because of the availability of null-data frames in 802.11.

MTA Opp. 21. Patent Owner does not argue this limitation. See MTA Reply 10–12. Based on the evidence presented, we find the cited art teaches this limitation.

“receive a number of uplink transmissions, sent from the receiving device through the phased array antenna, each of said number of uplink transmittable messages being sent by said receiving device as a result of a transmission of different one of said number of downlink transmittable messages, and wherein the number of said downlink transmittable messages comprising a null-data frame is at least two, and is equal to or greater than the number of said uplink transmittable messages”

Petitioner contends “Reudink and 802.11-1999 render this limitation obvious.” MTA Opp. 21. With regard to transmission of at least two downlink transmittable messages comprising a null-data frame as recited in the context of this limitation, the analysis and our finding relating to the immediately preceding limitation (“transmit a number of downlink transmittable messages comprising a null data frame . . .”) are pertinent. In addition, as discussed above with regard to the “wherein” clause of claim 16, Figure 12 of Reudink depicts an antenna of a base station transmitting a downlink message to “actively probe” a receiving station (RS) over at least two different beams. Petitioner contends “[a] POSA understands that forward MBAACHs [of Reudink] are over all beams and thus the number of forward MBAACHs is always at least two.” MTA Opp. 23 (citing Ex. 1020 (Negus Decl.) ¶ 168).

With regard to the sending of uplink messages to the access point from the receiving device as a result of the transmission of downlink messages in the context of this limitation, IEEE 802.11-1999 teaches:

A PC [point coordinator¹⁴] may send a broadcast or multicast frames, and directed data or management frames to any active STA[station¹⁵], as well as to CF-Pollable power save STAs. During the CFP [contention-free period¹⁶], CF-Pollable STAs shall acknowledge after a SIFS [short interframe space¹⁷] period, the receipt of each Data+CF-Poll frame or Data+CF-ACK+CF-Poll frame using Data+Ack or CF-Ack (no data) frames, the receipt of each CF_Poll (no data) using Data or Null (no data), and the receipt of all other data and management frames using ACK control frames. Non-CF-Pollable STAs shall acknowledge receipt of data and management frames using ACK Control frames send after a SIFS period. This non-CF-Pollable operation is the same as that already employed by such STAs for DCF [distributed coordination function¹⁸] operation.

Ex. 1019, 92; *see also id.* at 83, 86, 88, 96 and Ex. 1020 (Negus Decl.)

¶ 172.

With further regard to this limitation, Petitioner contends:

A POSA understands that the RS in the combined system of Reudink, Antonio, and 802.11-1999 only sends an ACK for the received forward MBAACH(s) and, thus, the number of forward MBAACHs sent in the downlink is always equal to or greater than the number of ACKs. Ex-1020 ¶173.

After the forward MBAACH and ACK exchange, the Reudink BS sends a poll message to cause the RS to transmit a reverse MBAACH. *Id.*, ¶174. After receiving the downlink poll message, the RS transmits a reverse MBAACH. *Id.* Each reverse MBAACH is sent in response to a different downlink message, *i.e.* a PCF poll message, and the number of downlink messages (forward MBAACH + poll) is equal to or greater than

¹⁴ Ex. 1019, 7.

¹⁵ *Id.* at 8; *see also id.* at 5 (“**station (STA)**: Any device that contains an IEEE 802.11 conformant medium access control (MAC) and physical layer (PHY) interface to the wireless medium (WM).”).

¹⁶ *Id.* at 6.

¹⁷ *Id.* at 8.

¹⁸ *Id.* at 6.

the number of uplink messages (ACK + reverse MBAACH). *Id.*, ¶170, 174, 177.

Reudink also discloses that the MBAACH exchange repeats, *i.e.*, it is an exchange of multiple uplink messages, each responsive to a different downlink message. Ex-1009: 11:1-4, 12:55-59; Ex-1020, ¶170.

MTA Opp. 24.

Petitioner's contentions with regard to this limitation are well-supported by the evidence (*see* MTA Opp. 23–26), and Patent Owner does not argue to the contrary (*see generally* MTA Reply). We find the cited art teaches this limitation.

“determine from at least one of the number of uplink transmissions if the receiving device should operatively associate with a different beam downlink transmission, wherein the determination is based at least in part on an angular parameter”

Petitioner contends, “Reudink renders this limitation obvious.” MTA 25. Petitioner argues:

According to Reudink, an angular parameter may be determined by the BS based at least in part on the reverse MBAACH message, including the angular information in it. Ex-1009: 11:64-66 (BS sends forward MBAACH messages with “current antenna beam information [that] provides the current antenna beam number and pointing angle”); 12:48-51 (reverse MBAACH provides “angles” . . . “above threshold”). The BS determines whether a beam switch should occur based at least in part on these angular parameters. *Id.*, 12:56-59 (the BS informs the RS that the “identified best carrier, angle, and beam is acceptable for communication”); Pet. 41; Ex-1020 ¶¶180-183, 189.

Alternatively, Reudink teaches optimizing beam allocations taking into account inter-cell interference and information determined through system operation such as

“information regarding particular RSs disposed within particular antenna beams [and] information regarding position and/or distance of the RSs.” Ex-1009: 4:19-27, 19:1-10; Ex-1020 ¶¶184-189. A POSA understands that an angle associated with a particular antenna beam is an angular parameter.

MTA Opp. 25. Patent Owner does not argue this limitation. See generally MTA Reply. Based on the arguments and evidence presented, we find the cited art teaches this limitation.

Motivation to Combine

Petitioner provides a number of reasonable and well-supported reasons why a person of ordinary skill in the art would have been motivated to combine the teachings of Reudink and 802.11-1999. See MTA Opp. 13–20. Petitioner contends, “[i]t would have been obvious to combine the system of Reudink with 802.11-1999 at the time of the ’728 Patent, given the state of the art and market forces.” *Id.* at 15 (citing Ex. 1020 (Negus Decl.) ¶¶ 120–121). In support of this contention, Petitioner states:

A POSA would know that 802.11 was the most widespread protocol for wireless networks in 2002, and was expected to grow. Ex-1023: 1-2; Ex-1020 ¶120. By the end of 2001, over 3 million 802.11 components were sold every quarter and over 23 million units were expected to ship annually by 2005. Ex-1023: 1; Ex-1024: 1. A POSA would thus be aware that 802.11 was of special interest in the field of wireless communications because it was so widespread at the time of the ’728 Patent. Ex-1020 ¶120. Further, market forces would have provided an incentive for a POSA to combine Reudink with 802.11-1999 because 802.11 was so widely used and both are from the same field of wireless system art. *Id.*, ¶121. Indeed, the background of the ’728 Patent admits “Currently, a very popular form of wireless communication includes the IEEE 802.11 family of protocols/standards.” Ex-1004: 2:10-11.

Id. Patent Owner does not dispute these contentions or the arguments or evidence Petitioner provides to support them.¹⁹ We agree with Petitioner and find that the state of the art and market forces would have provided a strong motivation to combine the relevant teachings of the cited art.

Petitioner further contends, “[a] POSA would [] be highly motivated to implement Reudink’s wireless communication system, base station (BS), and remote station (RS) in an 802.11-1999-based system to obtain numerous predictable and beneficial results, including reducing costs through using unlicensed spectrum, interoperability with millions of existing devices, and high throughput.” MTA Opp. 16 (citing Ex. 1020 (Negus Decl.) ¶ 125). Petitioner’s contentions are well-supported. *See id.* at 15–16. With regard to reducing costs through using unlicensed spectrum, Petitioner states, “[b]ecause Reudink notes that licensed spectrum in the 13 GHz range is ‘expensive’, a POSA would understand combining Reudink with 802.11-1999 would mean that Reudink would be able to utilize the unlicensed 2.4 GHz spectrum and thus achieve the desired bandwidth at significant cost savings.” *Id.* at 16 (citing 47 C.F.R. § 15.247 (2002) (permitting unlicensed operation between 2400 MHz and 2483.5 MHz); Ex.1020 (Negus Decl.) ¶ 124). With regard to interoperability with millions of existing devices,

¹⁹ The Specification of the ’728 patent is consistent with this finding and conclusion especially as it relates to using the teachings of the IEEE 802.11-1999 standard as of the filing date of the original application of the ’728 patent. We note again that the ’728 patent describes “the IEEE 802.11 family of protocol/standards” as “very popular” (Ex. 1001, 2:10–12); “an association process that establishes a communication link under IEEE 802.11(a), IEEE 802.11(b), IEEE 802.11(g), etc.” as “well known” (*id.* at 6:4–6, 23); and “IEEE 802.11 family compliant client devices” as “conventional” (*id.* at 8:23–24).

Petitioner states, “[b]y the end of 2001, over 3 million 802.11 components were sold every quarter and over 23 million units were expected to ship annually by 2005.” *Id.* at 15 (citing Ex. 1023, 1; Ex. 1024, 1). With regard to high throughput, Petitioner states, “[a] POSA would also combine Reudink and 802.11-1999 because they both are directed to high data rate wireless communications with rates of at least 1 MB/s.” *Id.* (citing Ex. 1009, 1:29-40; Ex. 1019, vi-vii). We agree with Petitioner that a person of ordinary skill in the art would be highly motivated to combine the relevant teachings of the cited art for these additional reasons.

Petitioner also contends that a person of ordinary skill would be motivated to combine Reudink with 802.11-1999 in order to “significantly increase[] communication capacity in 802.11 networks.” MTA Opp. 17.

Petitioner states:

[A] POSA would be motivated to combine Reudink with 802.11-1999 because Reudink provides for frequency reuse through the use of narrow antenna beams that would improve capacity in an 802.11 system. Using narrow antenna beams to maintain multiple parallel communications in space for otherwise shared time and frequency resources is known as SDMA, and was well-known at the time of the ’728 Patent. *Id.*, ¶126. Implementing SDMA, such as the multi-beam technology of Reudink, in combination with 802.11 had self-evident and known benefits including significantly increasing communication capacity in 802.11 networks, as others in the field recognized and disclosed as a combination. Ex-1021: 1:6-12; Ex-1018: 1:54-64; Ex-1027: 2:18-22; Ex-1020 ¶127.

Id. at 16–17. We agree with Petitioner that a person of ordinary skill in the art would be motivated to combine the relevant teachings of the cited art for this additional reason.

Petitioner further contends “a POSA would have had a reasonable expectation of success in combining Reudink and 802.11-1999.” MTA Opp. 18. This contention is well-supported. *Id.* at 18–20. Petitioner provides persuasive argument and evidence that “[a] POSA would possess by ordinary engineering skill the ability to combine Reudink’s MBAACH messaging within the existing architecture of 802.11-1991’s PCF [point coordination function] mode.” *Id.* at 19 (citing Ex. 1020 (Negus Decl.) ¶ 138).

Patent Owner argues that Petitioner does not establish a motivation to combine because “Petitioners’ Opposition relies on replacing Reudink’s CDMA architecture with 802.11’s optional PCF architecture.” MTA Reply 10 (citing Ex. 2010 (Short Decl.) ¶¶ 50–52). Patent Owner’s argument is based on a false premise. As shown above, Petitioner’s showing with regard to motivation to combine is not limited to and does not rely on the narrow technical detail that Patent Owner challenges. At most, Patent Owner challenges Petitioner’s showing with regard to reasonable expectation of success and fails to address the other persuasive reasoning and evidence Petitioner provides with regard to motivation to combine. *See id.* at 10–12. Moreover, even this narrow attack by Patent Owner is misdirected. In response to Patent Owner’s argument, Petitioner states:

[Patent Owner] misunderstands Reudink, and the combination. First, Reudink teaches a wireless communication system that is not limited to CDMA or any other architecture or communications protocol. MTA Opp. 14, Ex-1009: 2:39-40. Reudink is directed to managing multiple beam antenna resources and is “not limited to any physical layer implementation.” Ex-1020 ¶ 119. [Patent Owner]’s characterization of Reudink as being limited to a “CDMA architecture” (MTA Rep. at 10) is wrong: “[p]referred embodiments of the present invention utilize time division

multiple access (TDMA) communication channels to allow time sharing of RF channels among multiple users.” Reudink (Ex-1009) 4:58-61 (emphasis added), 2:38-40.

Second, a POSA would be motivated to combine Reudink and 802.11; not simply the Point Coordination Function (PCF) in 802.11. MTA Opp. 13-18. A POSA would be motivated by market forces, the technical compatibility of 802.11 with Reudink, and the desirability of implementing SDMA in 802.11. MTA Opp. 15-18. Contrary to [Patent Owner]’s argument, Petitioners refer to PCF as one way to implement Reudink’s MBAACH (i.e., control signaling) process within a system that complies with 802.11. MTA Opp. 11-12, 18-20. [Patent Owner] perpetuates its misunderstanding and criticizes PCF in an attempt to argue that a POSA would not be motivated to combine Reudink and PCF, rather than Reudink and 802.11. [Patent Owner]’s criticisms, however, are responsive to its own strawman argument, rather than the actual ground raised by Petitioners.

MTA Sur-reply 7–8 (footnote omitted). And, Petitioner provides a further persuasive response to Patent Owner’s technical argument. *See id.* at 8–9.

Petitioner states:

[Patent Owner] seizes on alleged drawbacks of PCF when “used to transport multimedia data over the WLAN.” Ex-1022: 8:62-67. However, Petitioners are not proposing the use of PCF to transport multimedia data. Instead, PCF is used for Reudink’s *control signaling, i.e.,* the MBAACH process, which occurs intermittently. MTA Opp. 18- 20. Petitioners do not suggest using PCF for data communications, which are not the subject of the ’728 Patent claims.

Id. at 9. In weighing all the arguments and evidence presented by the parties relating to the motivation to combine, we find that a clear and substantial preponderance of the evidence establishes that there would have been a strong motivation for a person of ordinary skill in the art to combine the

relevant teachings of the cited art with a reasonable expectation of success to arrive at the invention recited in proposed substitute claim 18.

Conclusion relating to Claim 18

Petitioner has shown that each and every limitation recited in substitute claim 18 is taught by the prior art and has shown a motivation to combine the relevant teachings of the cited references as recited in claim 18. For these reasons, we conclude that proposed substitute claim 18 would have been obvious in view of the combination of Reudink, Antonio, and IEEE 802.11-1999, and deny the motion to amend on this basis.²⁰

²⁰ Thus, we have determined that Patent Owner's Motion to Amend should be denied on two independent and sufficient bases: (1) a limitation sought to be added is not supported by the written description; and (2) the substitute claim would have been obvious. We, therefore, do not reach the other issues raised by the Patent Owner's Motion to Amend including the additional arguments Petitioner presents as to why the Motion to Amend should be denied. No implications, especially regarding the merits, should be drawn from our failure to decide these issues. The only reason we do not decide these issues is because it is unnecessary for us to do so.

III. CONCLUSION²¹

For the foregoing reasons, we conclude that Petitioner has established, by a preponderance of the evidence, that claim 16 is unpatentable. Patent Owner's Motion to Amend is denied.

In summary:

Claim	35 U.S.C. §	Reference(s)/Basis	Claim Shown Unpatentable	Claims Not shown Unpatentable
16	103	Reudink, Antonio	16	

Motion to Amend Outcome	Claim
Original Claim Cancelled by Amendment	16
Substitute Claim Proposed in Amendment	18
Substitute Claim: Motion to Amend Granted	
Substitute Claim: Motion to Amend Denied	18
Substitute Claims: Not reached	

²¹ 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).

IV. ORDER

Accordingly, it is:

ORDERED that claim 16 of U.S. Patent No. 7,729,728 B2 has been shown to be unpatentable;

FURTHER ORDERED that Petitioner'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.

IPR2018-01018
Patent 7,729,728 B2
PETITIONER:

John Baird
Matthew Yungwirth
DUANE MORRIS LLP
jmbaird@duanemorris.com
msyungwirth@duanemorris.com

Carol Ansley
ARRIS ENTERPRISES, LLC
carol.ansley@arris.com

PATENT OWNER:

Joel P.N. Stonedale
Kayvan B. Noroozi
William P. Rothwell
NOROOZI PC
joel@noroozipc.com
kayvan@noroozipc.com
william@noroozipc.com