

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MARVELL SEMICONDUCTOR, INC.
Petitioner,

v.

UNILOC 2017 LLC,
Patent Owner.

IPR2019-01350
Patent 7,016,676 B2

Before JAMESON LEE, KEVIN F. TURNER, and
MICHELLE N. WORMMEESTER, *Administrative Patent Judges*.

LEE, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. *Background and Summary*

Marvell Semiconductor Inc. (“Petitioner”) filed a Petition for *inter partes* review of claims 3 and 6–9 (“challenged claims”) of U.S. Patent No. 7,016,676 B2 (Ex. 1001, “the ’676 patent”). Paper 2 (“Pet.”). We instituted review on February 4, 2020. Paper 9 (“Decision on Institution”). Uniloc 2017 LLC (“Patent Owner”) filed a Patent Owner Response. Paper 13 (“PO Resp.”). Petitioner filed a Reply. Paper 14. Patent Owner filed a Sur-Reply. Paper 15. Oral hearing was held on November 12, 2020. A copy of the hearing transcript has been entered into the record as Paper 23 (“Tr.”).

For reasons explained below, we conclude that Petitioner has proved by a preponderance of the evidence that claims 3 and 9 of the ’676 patent are unpatentable.

B. *Real Parties-in-Interest*

Petitioner identifies itself as the only real party-in-interest. Pet. 76. Patent Owner identifies itself as the only real party-in-interest. Paper 6, 1.

C. *Related Matters*

The parties identify the following civil actions involving the ’676 patent:

Uniloc 2017 LLC v. Microsoft Corporation, No. 8:18-cv-01279 (C.D. Cal.);

Uniloc 2017 LLC v. Verizon Communications Inc., No. 2:18-cv-00380 (E.D. Tex.);

Uniloc 2017 LLC v. AT&T Inc., No. 2:18-cv-00379 (E.D. Tex.);

Uniloc 2017 LLC v. Google LLC, No. 2:18-cv-00448 (E.D. Tex.);

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Uniloc 2017 LLC v. AT&T Services, Inc., No. 2:18-cv-00514 (E.D. Tex.);

Uniloc 2017 LLC v. Verizon Communications Inc., No. 2:18-cv-00513 (E.D. Tex.);

Uniloc 2017 LLC v. Google LLC, No. 2:18-cv-00495 (E.D. Tex.); and

Uniloc 2017 LLC v. Microsoft Corporation, No. 8:18-cv-02053 (C.D. Cal.)

Pet. 76; Paper 6, 2; PO Resp. 10.

The '676 patent also is the subject of five other *inter partes* review proceedings: IPR2019-01116, IPR2019-01125, IPR2019-01349, IPR2019-01541, and IPR2019-01550. A final written decision in IPR2019-01116 was rendered on October 26, 2020. No *inter partes* review was instituted in IPR2019-01125, IPR2019-01541, and IPR2019-01550. A final written decision in IPR2019-01349 is rendered concurrently with this decision.

D. The '676 patent

The '676 patent “relates to a method of alternate control of radio systems of different standards in the same frequency band.” Ex. 1001, 1:7–9. For example, the two standards can be that of “US radio system IEEE802.11a and the European ETSI BRAN HiperLAN/2.” *Id.* at 1:19–20. “The two radio systems transmit in the same frequency bands between 5.5 GHz and 5.875 GHz with approximately the same radio transmission method, but different transmission protocols.” *Id.* at 1:20–23.

Specifically, under either ETSI BRAN HiperLAN/2 or IEEE802.11a, radio systems utilize the same radio transmission method, i.e., a 64-carrier OFDM method and adaptive modulation and coding. *Id.* at 28–31.

However, the Medium Access Control (MAC) of the two systems is “totally different.” *Id.* at 1:34–35. For these two standards, the frequency band “is

comprised between 5.15 GHz and 5.825 GHz.” *Id.* at 5:35–37. The ETSI BRAN HiperLAN/2 utilizes a centrally controlled reservation-based method in which a radio station takes over the role of a central station coordinating the radio resources. *Id.* at 1:35–38. That central radio station (Access Point, AP) periodically signals the MAC frame structure. *Id.* at 1:38–41. Figure 1 shows a frame structure and is reproduced below:

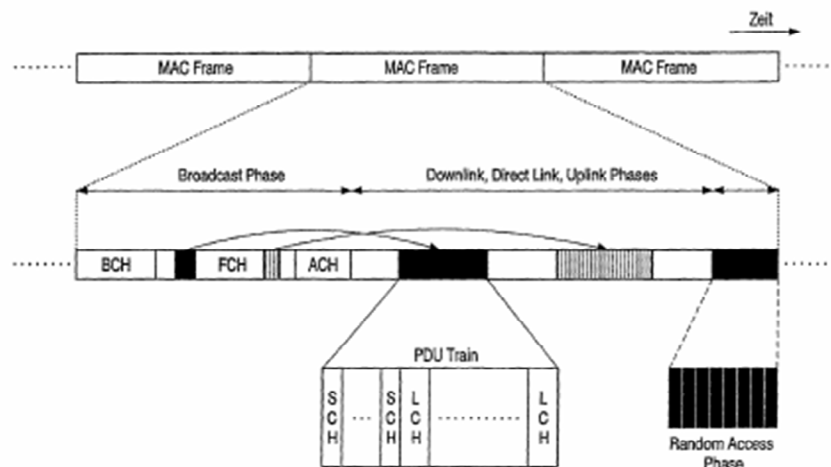


FIG. 1

Figure 1 shows the structure of the HiperLAN/2 MAC frame. *Id.* at 4:45–46. “In a HiperLAN/2 system the central controller can be controlled via the Access Point (AP) which periodically generates the MAC frame and then transmits the data of the broadcast phase to individually control the service quality (packet delay sending rate and so on) of individual links.” *Id.* at 4:50–54. Figure 2 is a representation of access to a radio channel according to the IEEE802/11a standard and reproduced below:

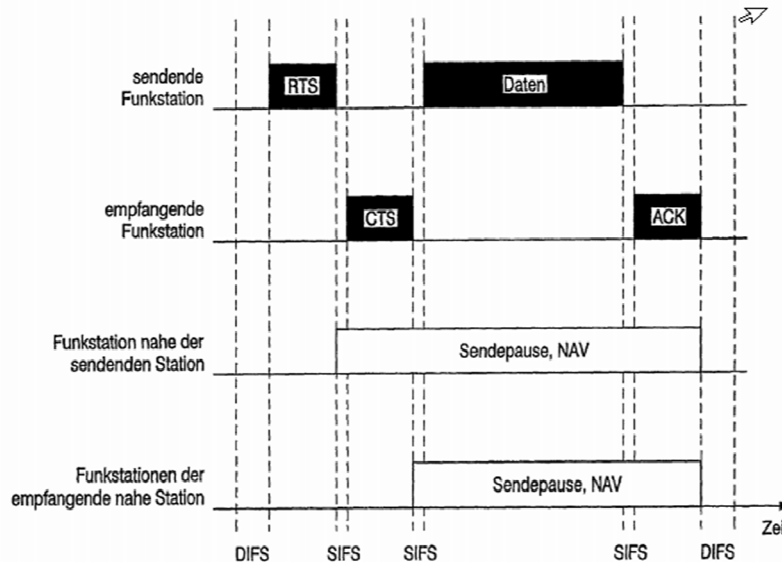


FIG. 2

Figure 2 shows the media access method in systems working in accordance with the radio interface standard IEEE802.11a. *Id.* at 4:47–49.

The Specification describes the IEEE802.11a standard as follows:

The IEEE802.11a standard describes a CSMA/CA (Carrier Sense Multiple Access/Collision Avoidance) method not based on reservations, in which all the radio stations listen in on the medium and assume that the channel is unused for a minimum duration (Short InterFrame Space, SIFS) before 802.11a-MAC frames, thus user data packets, are transmitted if necessary. The method is highly suitable for self-organizing ad hoc networks, but requires positive acknowledgements of all the packets.

Id. at 1:43–51. The Specification further describes the standard as follows:

FIG. 2 shows by way of example the sequence for media access in accordance with IEEE802.11a. In accordance with a variant of the standard a station is to then transmit an RTS packet (Ready To Send) and wait for a CTS packet (Clear To Send) from the addressed station before it is allowed to transmit user data. All the other stations in the radio coverage area set a time monitoring (Network Allocation vector, NAV) and do not transmit until the addressed station has been sent an acknowledgment (ACKnowledge, ACK).

Id. at 1:53–62.

Figure 3 of the '676 patent shows two networks and is reproduced below:

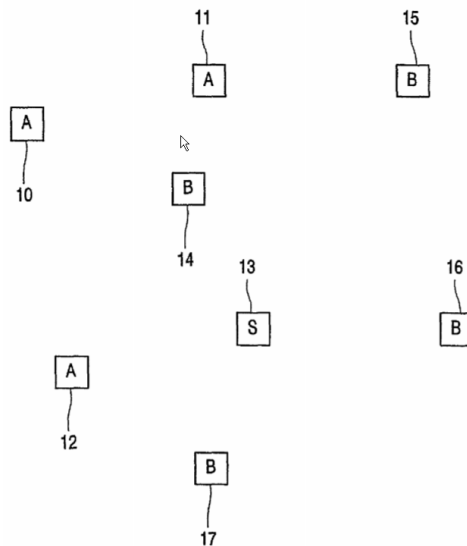


FIG. 3

Figure 3 illustrates two wireless local area networks in accordance with a first radio interface standard and a second radio interface standard of the '676 patent. *Id.* at 4:43–44. The '676 patent describes the standards as follows:

A first wireless local area network comprises three stations 10, 11, and 12. These three stations 10, 11, and 12 work in accordance with *the first radio interface standard A*, for example, in accordance with the HiperLAN/2 standard.

A second wireless local area network includes four stations 14, 15, 16, and 17. These four stations 14, 15, 16, and 17 work in accordance with *the second radio interface standard B*, for example, in accordance with the IEEE802.11a standard.

Id. at 5:22–30 (emphases added). In both standards, the frequency band is the same. *Id.* at 5:35–37.

Central control station 13 is provided which controls the alternate access by the first wireless network and the second wireless network to the

common frequency band. *Id.* at 5:39–41. The Specification describes the alternate access control as follows:

[T]he station 13 sends a broadcast message to the stations 14 to 17 of the IEEE802.11a standard when the stations 10 to 12 do not need transmission capacity. This broadcast message preferably contains time information which informs the stations 14 to 17 of the IEEE802.11[a] standard how long they are allowed to utilize the common frequency band.

If the stations 10 to 12 of the first wireless network are HiperLAN/2 stations, the control station 13 preferably also operates as the central control station (Access Point) of the HiperLAN/2 network and co-ordinates its radio resources. In HiperLAN/2 systems it is planned beforehand at what time the stations are allowed to send. For this purpose the HiperLAN/2 systems have a central controller (Access Point, AP) which receives the request for capacity from the various stations and assigns capacity accordingly. The central station 13 is preferably also provided for carrying out the function of the access point of the HiperLAN/2 standard.

Id. at 5:42–63.

The Specification describes that the control station is provided “for controlling the access to the frequency band for stations operating in accordance with the first radio interface standard.” *Id.* at 2:63–67. The Specification further describes that the control station is provided “for releasing the common frequency band for access by stations operating in accordance with the second radio interface standard, if stations operating in accordance with the first radio interface standard do not request access to the frequency band.” *Id.* at 3:7–13. According to the Specification, “the first radio interface standard is given priority over the second radio interface standard in this manner.” *Id.* at 3:13–15. The Specification states the following: “In accordance with the invention a control station is provided

which controls the alternate use of the common frequency band of the two radio interface standards.” *Id.* at 2:45–47.

Each of claims 1 and 6–9 is independent. Claim 3 depends from claim 1 and thus incorporates the limitations of claim 1. Claim 1 is not challenged in this proceeding. Claims 1 and 6–9 are reproduced below:

1. An interface-control protocol method for a radio system which has at least one common frequency band that is provided for alternate use by a first and a second radio interface standard, the radio system comprising:

stations which operate in accordance with a first radio interface standard and/or a second radio interface standard, and

a control station which controls the alternate use of the frequency band,

wherein the control station controls the access to the common frequency band for stations working in accordance with the first radio interface standard and—renders the frequency band available for access by the stations working in accordance with the second radio interface standard if stations working in accordance with the first radio interface standard do not request access to the frequency band.

6. An interface-control protocol method for a radio system which has at least one common frequency band that is provided for alternate use by a first and a second radio interface standard, the radio system comprising:

stations which operate in accordance with a first radio interface standard and/or a second radio interface standard, and

a control station which controls the alternate use of the frequency band,

wherein the control station terminates the use of the radio interface in accordance with the second radio interface standard by transmitting in accordance with the first

radio interface standard, without taking account of resulting interference in stations working in accordance with the second radio interface standard.

7. An interface-control protocol method for a radio system which has at least one common frequency band that is provided for alternate use by a first and a second radio interface standard, the radio system comprising:

stations which operate in accordance with a first radio interface standard and/or a second radio interface standard, and

a control station which controls the alternate use of the frequency band,

wherein the control station controls the access to the common frequency band by stations working in accordance with the first radio interface standard and in that duration and type of control of the radio interface in accordance with the second radio interface standard is determined by a further station and transmitted to the control station.

8. An interface-control protocol method for a radio system which has at least one common frequency band that is provided for alternate use by a first and a second radio interface standard, the radio system comprising:

stations which operate in accordance with a first radio interface standard and/or a second radio interface standard, and

a control station which controls the alternate use of the frequency band,

wherein the control station, in addition to functions in accordance with the second radio interface standard, also carries out functions which cause radio systems in accordance with the second radio interface standard to interpret the radio channel as interfered and to seize another radio channel for its own operation.

9. A wireless network comprising at least one common frequency band provided for alternate use by a first and a second radio interface standard, the wireless network comprising:

stations which work in accordance with a first radio interface standard and/or in accordance with a second radio interface standard, and

a control station which controls the alternate use of the common frequency band,

wherein the control station controls the access to the common frequency band for stations working in accordance with the first radio interface standard and—renders the frequency band available for access by the stations working in accordance with the second radio interface standard if stations working in accordance with the first radio interface standard do not request access to the frequency band.

Ex. 1001, 6:20–36, 6:56–8:26.

E. Evidence Relied on by Petitioner

Petitioner relies on the following references:¹

| References | | Date | Exhibit |
|-------------|----------------------------|--|----------|
| Sherman | US Patent No. 7,031,274 B2 | Issued Apr. 18, 2006; Filed Jan. 1, 2002 | Ex. 1004 |
| Shellhammer | US Patent No. 7,039,358 B1 | Issued May 2, 2006; Filed Nov. 16, 2000 | Ex. 1005 |
| Trompower | US Patent No. 6,215,982 B1 | Issued Apr. 10, 2001; Filed June 28, 1996 | Ex. 1006 |

¹ The '676 patent issued from Application No. 10/089,959, which is a national phase application of International Application No. PCT/EP01/09258 filed under the Patent Cooperation Treaty and 35 U.S.C. § 371 on Aug. 8, 2001. Ex. 1001, codes (21), (22), (86).

| References | | Date | Exhibit |
|------------|----------------------------|---|----------|
| Panasik | US Patent No. 6,643,278 B1 | Issued Nov. 4, 2003; Filed Dec. 28, 1999 | Ex. 1015 |

Petitioner additionally relies on the Declaration of Sumit Roy, Ph.D. (Ex. 1003).

F. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability:

| Claim(s) Challenged | 35 U.S.C. § ² | Basis |
|---------------------|--------------------------|------------------------|
| 3, 6, 9 | 103 | Sherman |
| 8 | 103 | Sherman, Trompower |
| 3, 7, 9 | 102 | Shellhammer |
| 8 | 103 | Shellhammer, Trompower |
| 8 | 103 | Shellhammer, Panasik |

G. Effective Filing Date of the '676 Patent

The '676 patent issued from Application No. 10/089,959, which is a national phase application of International Application No. PCT/EP01/09258, filed on Aug. 8, 2001, under the Patent Cooperation Treaty and 35 U.S.C. § 371. Ex. 1001, codes (21), (22), (86). No ancestral foreign patent application with an earlier filing date is identified on the '676 patent. However, Patent Owner asserts that “[t]he publication of the International Application clearly shows the claim of priority to German

² The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, 125 Stat. 284, 287–88 (2011), revised 35 U.S.C. § 103 effective March 16, 2013. Because the challenged patent has an effective filing date prior to March 16, 2013 (Ex. 1001, codes (22), (63)), we refer to the pre-AIA versions of § 103.

Application No. 100 39 532.5, with a filing date of August 8, 2000. Ex. 2001, Item (30).” PO Resp. 8. Patent Owner asserts that a foreign priority claim was made during prosecution of the national phase application and that the Examiner erroneously rejected the foreign priority claim on the basis that a certified copy of the foreign application was not provided to the Office. PO Resp. 8–10.³

Patent Owner concludes that “the priority claim should be accorded.”⁴ *Id.* at 10. The argument is misplaced. The record before us shows that the Examiner denied the patent applicant’s foreign priority claim. Even if the Examiner’s decision was incorrect, the time for Patent Owner to make correction was during prosecution or in a reissue application, not here in an *inter partes* review proceeding. The Examiner’s decision rejecting an applicant’s foreign priority claim is not on review in this proceeding.

Further, even assuming that the Patent Owner successfully shows that the Examiner erred in not accepting the applicant’s foreign priority claim, that does not mean Patent Owner, in this proceeding, is automatically entitled to the filing date of the foreign application. If Patent Owner wished to challenge the prior art status of a reference, after Petitioner satisfied its initial burden of production by saying the reference is prior art, Patent Owner would then have to demonstrate, in this proceeding, that the

³ Patent Owner explains as follows: “Thus, as of the September 22, 2004, mailing date of the first Office Action, the Examiner confirmed that the International Bureau had provided some, and thus at least one, certified copy. As only one certified copy could have been provided, given the single priority claim, it is clear that the certified copy was provided by the International Bureau.” PO Resp. 10.

⁴ If the ’676 patent is accorded the August 8, 2000 filing date of the German Application, then that filing date pre-dates the applicable date of Shellhammer, and Shellhammer cannot be applied as prior art.

challenged claims indeed do satisfy the requirements of 35 U.S.C. § 119 with respect to the foreign application the priority of which it claims.⁵ *Cf. Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1379–1380 (Fed. Cir. 2015). Dynamic Drinkware stated that because the USPTO does not examine priority claims unless necessary, the Board has no basis to presume that a patent is necessarily entitled to the filing date of its provisional application. *Id.* at 1380. Under the reasoning of *Dynamic Drinkware*, the same would be true for a foreign application the priority of which has been claimed. Patent Owner has made no substantive showing in this proceeding of actual entitlement to the filing date of the German Application, by satisfaction of all pertinent requirements of 35 U.S.C. § 119. Accordingly, the effective filing date of the '676 patent is August 8, 2001, not the earlier filing date of German Application No. 100 39 532.5.

II. ANALYSIS

A. Principles of Law

To prevail in its challenge to Patent Owner's claims, Petitioner must demonstrate by a preponderance of the evidence that the claims are unpatentable.⁶ 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). That burden never shifts to the patentee. *Dynamic Drinkware*, 800 F.3d at 1378.

⁵ “[I]f the effective filing date of what is claimed in a United States application is at issue, to preserve symmetry of treatment between sections 120 and 119, the foreign priority application must be examined to ascertain if it supports, within the meaning of section 112, ¶ 1, what is claimed in the United States application.” *In re Gosteli*, 872 F.2d 1008, 1011 (Fed. Cir. 1989).

⁶ The burden of showing something by a preponderance of the evidence requires the trier of fact to believe that the existence of a fact is more probable than its nonexistence before the trier of fact may find in favor of

A patent claim is unpatentable under 35 U.S.C. § 103(a) 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) when in evidence, objective evidence of nonobviousness.⁷ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

In determining the level of ordinary skill in the art, various factors may be considered, including the type of problems encountered in the art, 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). “[E]very factor may not be present, and one or more factors may predominate.” *Id.*

Petitioner asserts that the level of ordinary skill in the art is reflected by one who “would have had a Bachelor’s Degree in Electrical Engineering, Computer Science, or a related subject and one or more years of experience working with wireless networks and related standards, and would have had

the party who carries the burden. *Concrete Pipe & Prods. of Cal., Inc. v. Constr. Laborers Pension Tr. for S. Cal.*, 508 U.S. 602, 622 (1993).

⁷ Patent Owner has not presented any objective evidence of nonobviousness or any argument in that regard.

an understanding of work within the field of wireless networks and related standards, including, e.g., systems or protocols for shared access of wireless networks by different protocols.” Pet. 11 (citing Ex. 1003 ¶¶ 62–63). Patent Owner states that it “does not offer a competing definition for [a] POSITA [person of ordinary skill in the art].” PO Resp. 11.

We have no reason to disagree with Petitioner’s articulation of the level of ordinary skill, which is supported by the testimony of Dr. Roy (Ex. 1003 ¶¶ 62–63), except to note that the open-ended qualifier “or more” as applied to years of experience expands the level to encompass that of an expert, which is inappropriate for the level of “ordinary skill.” Petitioner’s articulation without the expansive qualifier appears consistent with what is reflected by the content of the applied prior art references. *Cf. Okajima v. Bourdeau*, 261 F.3d 1350, 1354–55 (Fed. Cir. 2001) (the applied prior art may reflect an appropriate level of skill). Therefore, we adopt the Petitioner’s articulation of the level of ordinary skill, but without the expansive qualifier “or more” as applied to the amount of experience.

C. Claim Construction

For petitions filed on or after November 13, 2018, we use the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. *See* 37 C.F.R. § 42.100 (2019). The Petition here was filed on July 22, 2019. Paper 2. We apply the claim construction standard from *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc).

Claim terms are generally given their ordinary and customary meaning as would be understood by one with ordinary skill in the art in the context of the specification, the prosecution history, other claims, and even extrinsic evidence including expert and inventor testimony, dictionaries, and learned treatises, although extrinsic evidence is less significant than the intrinsic record. *Phillips*, 415 F.3d at 1312–17. Usually, the specification is dispositive, and it is the single best guide to the meaning of a disputed term. *Id.* at 1315.

The specification may reveal a special definition given to a claim term by the patentee, or the specification or prosecution history may reveal an intentional disclaimer or disavowal of claim scope by the inventor. *Id.* at 1316. If an inventor acts as his or her own lexicographer, the definition must be set forth in the specification with reasonable clarity, deliberateness, and precision. *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998). The disavowal of claim scope, if any, can be effectuated by language in the specification or the prosecution history. *Poly-America, L.P. v. API Indus., Inc.*, 839 F.3d 1131, 1136 (Fed. Cir. 2016). “In either case, the standard for disavowal is exacting, requiring clear and unequivocal evidence that the claimed invention includes or does not include a particular feature.” *Id.*

Only those claim terms that are in controversy need to be construed, and only to the extent necessary to resolve the controversy. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Matal*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

*“stations which operate in accordance
with a first radio interface standard
and/or a second radio interface standard”*

Claims 1, 6, 7, 8, and 9 each recite “stations which operate in accordance with a first radio interface standard and/or a second radio interface standard.” Ex. 1001, 6:24–26, 6:60–62, 7:8–10, 7:24–26, 8:12–14. Although Petitioner asserts that no construction is necessary for this phrase and that the plain and ordinary meaning applies, Petitioner nonetheless proposes that the phrase, according to its plain and ordinary meaning, means “stations, each of which operates in accordance with a first radio interface standard, a second radio interface standard, or both.” Pet. 13–14 (emphasis omitted). Patent Owner asserts that no construction is necessary. PO Resp. 14. Regarding Petitioner’s articulation of the plain and ordinary meaning of the phrase, Patent Owner has not refuted it in any way, and it appears consistent with what the phrase ostensibly indicates. Thus, on the record before us, we accept and adopt Petitioner’s articulation of the plain and ordinary meaning for this phrase.

*“renders the frequency band available for
access by the stations working in accordance
with the second radio interface standard if stations
working in accordance with the first radio interface
standard do not request access to the frequency band”*

Claims 1 and 9 each recites: “renders the frequency band available for access by the stations working in accordance with the second radio interface standard if stations working in accordance with the first radio interface standard do not request access to the frequency band.” Ex. 1001, 6:32–36, 8:21–25. For this phrase, Petitioner asserts that “claim

construction is not necessary.”⁸ Pet. 14. Patent Owner, likewise, “submits that the Board need not construe this claim term.” PO Resp. 14. We agree with the parties that express claim construction of this claim term is not necessary. Although no additional discussion is necessary, we point out certain inaccuracies in the Patent Owner Response, to avoid potential confusion.

Patent Owner states that “the Board should not adopt Petitioner’s proposed construction.” PO Resp. 14. Patent Owner articulates what it asserts is Petitioner’s proposed construction and the basis for that construction, and then attempts to refute it. *Id.* at 15–17. These arguments need not be addressed, because Petitioner has not proposed a construction for this claim term or argued that any particular construction should be adopted. Both parties indicate that no construction is necessary. Pet. 14; PO Resp. 14.

“wherein the control station, in addition to functions in accordance with the second radio interface standard, also carries out functions which cause radio systems in accordance with the second radio interface standard to interpret the radio channel as interfered and to seize another radio channel for its own operation”

Claim 8 recites “wherein the control station, in addition to functions in accordance with the second radio interface standard, also carries out

⁸ Petitioner additionally refers to the construction proposed by Microsoft Corporation in IPR2019-01116 and to what it believes Patent Owner has alleged in related district court litigation, but does not express agreement or disagreement with either. Pet. 15. Petitioner’s position for this claim term simply is that claim construction is unnecessary. Petitioner has not proposed a construction for the Board to adopt.

functions which cause radio systems in accordance with the second radio interface standard to interpret the radio channel as interfered and to seize another radio channel for its own operation.” Ex. 1001, 8:1–6. We address the meaning of this recitation below, within the focused analysis for claim 8, where better context is provided.

the steps within method claims 3, 6, and 7

We need not make any express construction here, except to identify what step or steps are required by the methods of claims 3, 6, and 7.

1. The Steps within the Method of Claim 3

Claim 3 depends from claim 1, and thus we begin by determining what steps are within independent claim 1.

Claim 1 begins with the recitation “[a]n interface-control method for a radio system” but follows only with recitations of the components of the radio system and a “wherein” clause that sets forth what the control station does in certain circumstances. Ex. 1001, 6:20–36. We recognize claim 1 as a method claim, but no step or steps within the method are facially evident. We resort to the Specification for clues on how to read this claim.

Notably, claim 1 first recites two types of components of a radio system: (1) stations and (2) a control station. *Id.* Next, in a wherein clause following the paragraphs defining these two types of components, the claim recites that “the control station controls . . . and—renders” *Id.* at 6:29–36. Corresponding disclosure in the Specification relating to the two actions included in the wherein clause reads as follows:

[T]he control station is provided, on the one hand, for controlling the access to the frequency band for stations operating in accordance with the first radio interface standard. If the first radio interface standard is, for example, the HiperLAN/2 standard, the control station performs the function

of the central controller (Access Point AP) in accordance with this standard. In that case the stations of the HiperLAN/2 standard send a request for capacity to the control station and the control station allocates transmission capacity to each respective station.

On the other hand, *the control station is provided in an advantageous embodiment of the invention . . . for releasing the common frequency band for access by stations operating in accordance with the second radio interface standard, if stations operating in accordance with the first radio interface standard do not request access to the frequency band. . . .* The release of the common frequency band for the second radio interface standard may be effected, for example, explicitly by the sending of control information to the stations of the second radio interface standard.

Ex. 1001, 2:63–3:19 (emphases added). This portion of the Specification describes a control station “provided” for carrying out the two functionalities named in the wherein clause. It reflects a step-like disclosure that is outside of merely defining what a component does, and it corresponds readily to the functionalities included within the wherein clause of claim 1.

In light of the Specification, as noted above, we read the wherein clause of claim 1 as setting forth two steps, both carried out by the control station: (1) “controls access to the common frequency band for stations working in accordance with the first radio interface standard,” and (2) “renders the frequency band available for access by the stations working in accordance with the second radio interface standard if stations working in accordance with the first radio interface standard do not request access to the frequency band.” That is consistent with how Petitioner has applied the prior art to claim 1, although Petitioner has not expressly articulated these specific steps.

We recognize that the written description is not a substitute for claim language and cannot be used to rewrite the claim language, and that it is important not to import into a claim limitations that are not a part of the claim. *SuperGuide Corp. v. DirecTV Enterprises, Inc.*, 358 F.3d 870, 875 (Fed. Cir. 2004). That is not the case here. Rather, we simply look to the written description to determine how the claim language is properly read in light of that written description, reasonably, to set forth the steps of the claimed method. *See id.*

Claim 3 additionally recites “wherein the control station sends a broadcast signal informing the stations of a time duration in which the common frequency band can be used by stations working in accordance with the second radio interface standard.” Ex. 1001, 6:41–45. We read this limitation as adding a third step, also performed by the control station, of sending a broadcast signal informing the stations of a time duration in which the common frequency band can be used by stations working in accordance with the second radio interface standard.

2. The Step within the Method of Claim 6

Claim 6 is similar to claim 1, except for the wherein clause. The wherein clause of claim 6 recites “wherein the control station terminates the use of the radio interface in accordance with the second radio interface standard by transmitting in accordance with the first radio interface standard, without taking account of resulting interference in stations working in accordance with the second radio interface standard.” Ex. 1001, 6:65–7:3. We read this language as setting forth a step, performed by the control station, of “*terminating the use of the radio interface in accordance with the second radio interface standard by transmitting in accordance with the first*

radio interface standard, without taking account of resulting interference in stations working in accordance with the second radio interface standard.”

3. The Step within the Method of Claim 7

Claim 7 is similar to claim 1, except for the wherein clause. The wherein clause of claim 7 recites “wherein the control station controls the access to the common frequency band by stations working in accordance with the first radio interface standard and in that duration and type of control of the radio interface in accordance with the second radio interface standard is determined by a further station and transmitted to the control station.” *Id.* at 7:13–19. We read this language as setting forth a step, performed by the control station, of “*controlling the access to the common frequency band by stations working in accordance with the first radio interface standard and in that duration and type of control of the radio interface in accordance with the second radio interface standard is determined by a further station and transmitted to the control station.*”

We made the same identification of steps for claims 3, 6, and 7 in the Decision on Institution. Paper 9, 18–21. Post institution of trial, neither party has argued that this reading of claims 3, 6, and 7 is incorrect.

D. *Alleged Unpatentability of Claims 3, 6, and 9 as Obvious over Sherman*

1. *Prior Art Status of Sherman*

The filing date of Sherman is January 1, 2002. The effective filing date of the ’676 patent, as determined above, is August 8, 2001. Sherman is not an applicable prior art reference unless its effective filing date is the date of its ancestral Provisional Application No. 60/261,935, January 16, 2001. Ex. 1004, code (60). The Federal Circuit has stated that “because the PTO does not examine priority claims unless necessary, the Board has no basis to

presume that a reference patent is necessarily entitled to the filing date of its provisional application.” *Dynamic Drinkware*, 800 F.3d at 1380. Further, because the effective filing date of the ’676 patent, August 8, 2001, is prior to the filing date of Sherman, January 1, 2002, it is Petitioner who bears the burden of production to prove that, under 35 U.S.C. § 119(e)(1), Sherman was entitled to the benefit of the filing date of its provisional application which was filed on January 16, 2001. Ex. 1004, code (60). *See id.*

“A reference patent is only entitled to claim the benefit of the filing date of its provisional application if the disclosure of the provisional application provides support for the claims in the reference patent in compliance with § 112, ¶ 1.” *Dynamic Drinkware*, 800 F.3d at 1381. In its Petition, Petitioner made no such showing for any claim in Sherman. During oral hearing, when the panel inquired counsel for Petitioner with regard to this issue, counsel for Petitioner responded with four arguments.

First, counsel for Petitioner referred to paragraph 120 of Dr. Roy’s Declaration (Ex. 1003) as establishing that the Sherman provisional application contains the same material as that in Sherman which Petitioner has relied on in the Petition. Tr. 20. That argument is non-responsive, because the Petition relies on Sherman to account for the claims of the ’676 patent, not to account for any claim in Sherman.

Second, counsel for Petitioner argued that what was discussed in the Sherman provisional application was Sherman’s invention and thus it is “implicit” that the Petition discusses that the disclosure of the Sherman provisional application supports the Sherman claims. *Id.* at 21–22. We disagree. From the Petition, it is entirely unknown which claim or claims is supported by the disclosure of the Sherman provisional application and why.

It simply cannot be assumed that any Sherman claim is supported by the disclosure of the Sherman provisional application.

Third, counsel for Petitioner invited the Board to look at claim 1 of Sherman and see for ourselves that the disclosure of the Sherman provisional application, discussed by Dr. Roy, indeed supports Sherman claim 1. *Id.* at 20–21. This effort is way too late. Oral hearing is not a time to introduce arguments not previously presented in the parties’ submissions. *See* Consolidated Trial Practice Guide (November 2019) 85–86, accessible at <https://www.uspto.gov/TrialPracticeGuideConsolidated>. Further, how the disclosure of the Sherman provisional application supports a Sherman claim has to be alleged and explained to us by Petitioner. Asking the Board to determine this on its own does not carry Petitioner’s burden of persuasion.

Finally, counsel for Petitioner argues that Patent Owner did not raise the issue in the Patent Owner Response and thus should be deemed as having been waived. Tr. 23. Counsel for Petitioner notes that the Scheduling Order (Paper 10) states that arguments not raised in the Patent Owner Response may be deemed waived. *Id.* Whether or not Patent Owner raised the issue, Petitioner bears the burden of production that Sherman is entitled to the earlier filing date of its provisional application, because the effective filing date of the ’676 patent is prior to the actual filing date of Sherman. The Scheduling Order uses the language “may be deemed waived” by Patent Owner, but does not preclude the Board from addressing the matter.

For the foregoing reasons, Sherman as a prior art reference is not entitled to the date of its Provisional Application No. 60/261,935, January 16, 2001. The applicable date of Sherman as a prior art reference is its actual filing date, January 1, 2002. The effective filing date of the ’676

patent, as determined above, is August 8, 2001. Consequently, Sherman cannot be applied as prior art against any claim in the '676 patent.

For completeness on judicial review, we continue with the substantive analysis of the obviousness ground of unpatentability of claims 3, 6, and 7 over Sherman, *assuming* that Sherman is applicable prior art.

2. *Overview of Sherman*

Sherman discloses a data transmission system using a common channel shared by devices operating under two different interface standards, i.e., “802.11a standard” and “HIPERLAN/2 standard.” Ex. 1004, Abstr., 1:12–17. Sherman discloses that both the 802.11a standard and the HIPERLAN/2 standard work with frequencies between 5 and 6 GHz. *Id.* at 1:36–42. Sherman describes that many situations exist where wireless local area networks operating under the 802.11a standard must substantially coexist with wireless local area networks operating under the HIPERLAN/2 standard, and that contention collisions are frequent. *Id.* at 1:50–53. Sherman states that the contention collisions must be resolved if the two wireless local area networks are to operate without interference in close proximity to each other. *Id.* at 1:53–55.

Sherman asserts that previously a method has been proposed to support interoperation of these two standards by use of a super-frame structure including an 802.11a standard phase and a HIPERLAN/2 phase. *Id.* at 1:56–65. However, Sherman indicates that method has drawbacks in that it presumes the terminals operating under the 802.11a standard can be prevented from transmitting during the HIPERLAN/2 phase. *Id.* at 2:1–5. According to Sherman, “[c]urrently, no mechanism exists within the 802.11a standard to allow” that preclusion. *Id.* at 2:5–7.

Sherman proposes a mechanism, “in a transmission channel shared by 802.11 systems and HIPERLAN/2 systems,” “to prevent 802.11 terminals from transmitting during time periods allocated to ‘HIPERLAN,’” so that a single channel can be shared between devices operating under different standards. *Id.* at 2:11–15. Specifically, a super-frame format is used wherein HIPERLAN transmissions are made within the Contention Free Period (“CFP”) of the 802.11a standard and given “the highest level of protection possible.” *Id.* at 2:15–19.

Sherman notes that WLANs are accessed through stations that operate as access ports (AP). *Id.* at 3:3–4. Sherman refers to such a station/access port as “STA/AP.” *Id.* at 3:15–23. A terminal is referred to as a station or “STA.” *Id.* at 3:24–35. Sherman explains that “802.11 STAs have a mechanism called the Network Allocation Vector (NAV) that can be set to prevent the STA from transmitting.” *Id.* at 3:29–31. Sherman proposes a solution as shown in Figure 5, reproduced below:

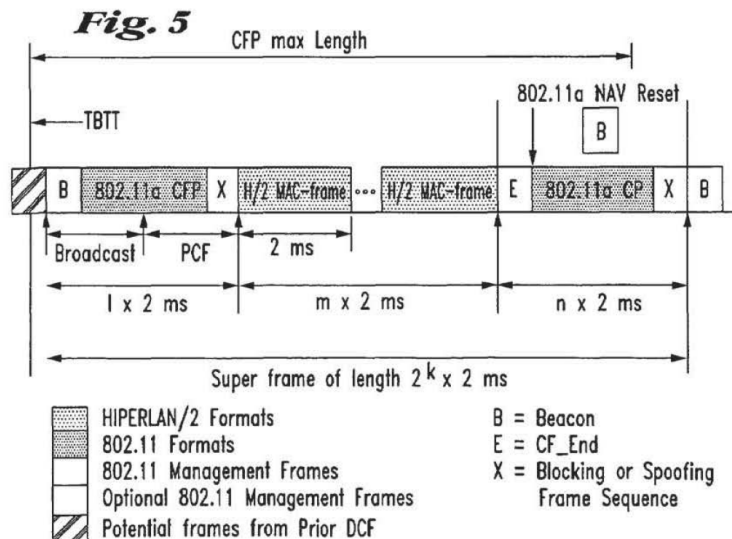


Figure 5 is an illustration of Sherman’s proposed super-frame structure “for permitting interoperability between 802.11a WLANS and HIPERLAN WLANS.” *Id.* at 2:33–36.

The super-frame structure shown in Figure 5 allows 802.11a stations (STA and P) to share a single channel with HIPERLAN/2 stations. *Id.* at 3:62–66. “HIPERLAN/2 transmission occurs within the HIPERLAN/2 phase that is buried within the Contention Free Period (CFP) of 802.11. The CFP occurs with a regular period, and all 802.11 terminals set their NAV’s during the CFP.” *Id.* at 3:66–4:3.

“B” stands for CFP_Beacon and it starts a CFP. *Id.* at 4:8. The super-frame includes three phases, and the first consists of the CFP_Beacon, 802.11 Broadcast, and 802.11 CFP. *Id.* at 4:12–17. The second is called the “HIPERLAN/2 phase” for HIPERLAN/2 transmissions, and the third starts from “E” (meaning “CF_End” signifying end of Contention Free Period (Fig. 5; Ex. 1004, 5:49)) to the end of the super-frame, including the Contention Period of 802.11a (“802.11 CP”). *Id.* at 4:20–22. From the perspective of a terminal operating under the 802.11a standard, however, the entire duration from “B” to “E” is considered “the 802.11 CFP,” i.e., the Contention Free Period of the 802.11a standard. *Id.* at 4:23–26, 5:34–36.

As shown in Figure 5 above, the H/2 MAC-frames represent HIPERLAN/2 transmissions and they occur during a portion “of the 802.11 CFP.” *Id.* at 5:48–52. Sherman describes that “802.11 terminals” are prevented from transmitting during time periods allocated to “HIPERLAN.” *Id.* at 2:11–14. Sherman describes that “during the CFP, all 802.11 stations will remain quiet until CFP max Interval.” *Id.* at 5:14–15. Sherman describes that the NAV, if set in a station, keeps the station from transmitting, *id.* at 3:29–31, and that “all 802.11 terminals set their NAV’s during the CFP.” *Id.* at 4:2–3. And then, to relinquish time to Contention Period CP, when signal “E” is sent, “all terminals automatically reset their NAV’s.” *Id.* at 6:6–8. “[B]y embedding HIPERLAN/2 transmissions

within the contention free period of the 802.11a format both systems operate [without] interference to/from each other.” *Id.* at 5:63–65.

3. *Claim 3*

As noted above, Petitioner has not shown Sherman to be applicable prior art. Thus, Petitioner has not proved by a preponderance of the evidence that claim 3 would have been obvious over Sherman. For completeness on judicial review, we provide a substantive analysis of claim 3, *assuming* that Sherman is applicable prior art.

Claim 3 depends from claim 1, and thus we begin by discussing the limitations incorporated from claim 1.

Claim 1 recites “[a]n interface-control protocol method for a radio system which has at least one common frequency band that is provided for alternate use by a first and a second radio interface standard.” Ex. 1001, 6:20–23. Claim 1 further recites that the radio system comprises “stations which operate in accordance with a first radio interface standard and/or a second radio interface standard.” *Id.* at 6:24–26.

We agree with Petitioner’s assertion (Pet. 20–23) that Sherman discloses an interface-control protocol method for a radio system which has at least one common frequency band that is provided for alternate use by a first radio interface standard and a second radio interface standard, and that Sherman discloses stations which operate in accordance with a first radio interface standard and/or a second radio interface standard. In that regard, Patent Owner has not presented arguments which contend otherwise.

Petitioner asserts that Sherman contains numerous disclosures of a radio system with a transmission channel shared by 802.11 systems and HIPERLAN/2 systems and that Sherman addresses the situation where HIPERLAN/2 and IEEE 802.11 utilize at least one common frequency band

between 5 and 6 GHz. Pet. 21 (citing Ex. 1004, 1:36–42, 2:11–19, 2:53–61, 3:62–66; Ex. 1003 ¶¶ 138–39). The assertion is supported by the disclosure of Sherman as well as the cited testimony of Dr. Roy. For instance, as discussed above, HIPERLAN/2 transmission occurs within the HIPERLAN/2 phase within the Contention Free Period of 802.11. Ex. 1004, 3:66–4:3. During that time, the NAV is set in all 802.11 terminals, which prevents the 802.11 terminals from transmitting. *Id.* at 2:11–14, 3:29–31, 4:2–3. Later, the signal E is sent, automatically resetting the NAVs and relinquishing time to Contention Period CP, during which the 802.11 terminals are free to transmit. *Id.* at 3:54–56, 6:6–8.

Petitioner identifies Sherman’s stations 111, 113, and 115 as stations which operate under the first radio interface standard, i.e., HIPERLAN/2, and/or under the second radio interface standard, i.e., 802.11a. Pet. 21–23 (citing Ex. 1004, 2:52–3:14; Ex. 1003 ¶¶ 143, 145). The assertion is supported by the cited disclosure of Sherman as well as the cited testimony of Dr. Roy. For instance, Mr. Roy testifies that in Sherman IEEE 802.11a and HIPERLAN/2 WLANs operate on close proximity, and that Sherman depicts these WLANs with a mixture of IEEE 802.11 and HIPERLAN/2 stations. Ex. 1003 ¶ 145.

Claim 1 further recites that the radio system comprises “a control station which controls the alternate use of the frequency band.” Ex. 1001, 6:27–28. For reasons discussed below, we are persuaded by Petitioner that Sherman discloses a control station which controls the alternate use of the frequency band. In that regard, Patent Owner has not presented arguments contending otherwise.

Petitioner identifies Sherman’s “Access Point,” also referenced as “access port” or merely “AP,” as the claimed control station. Pet. 23–24

(citing Ex. 1004, 2:62–3:14; Ex. 1003 ¶¶ 150–151). Petitioner explains that Sherman begins and ends its discussion of its embodiments by describing how a hybrid AP controls 802.11a and HIPERLAN/2 traffic, including the periods they are allowed to access the channel. *Id.* (citing Ex. 1004, 3:57–61, 5:66–67; Ex.1003 ¶ 152). Sherman refers to an AP which supports two standards as a “hybrid AP.” Ex, 1004, 3:13–14.

As to alternate use, Petitioner notes that Sherman provides exclusive access for HIPERLAN/2 transmissions by scheduling them during the IEEE 802.11 contention free period, when IEEE 802.11 stations have their NAVs set to prevent them from transmitting. *Id.* at 24 (citing Ex. 1004, 2:17–19). As shown in Figure 5 of Sherman, the super-frame controls the alternate use through the “B” and “E” signal frames. As to a common frequency band, Petitioner points out, relying on Dr. Roy’s testimony, that Sherman discloses alternate use of a channel within a common frequency band. *Id.* at 26 (citing Ex. 1003 ¶ 168). Indeed, Sherman discloses that a single channel is shared between the 802.11 standard and the HIPERLAN/2 standard. Ex. 1004, Abstr., 2:11–15.

We are persuaded that Sherman’s hybrid AP controls the alternate use of the frequency band between HIPERLAN/2 stations and 802.11a stations, thus satisfying claim 1’s recitation of “a control station which controls the alternate use of the frequency band.”

Claim 1 further recites a wherein clause which, as explained above in Section II.C., sets forth two steps:

(1) controls access to the common frequency band for stations working in accordance with the first radio interface standard, and

(2) renders the frequency band available for access by the stations working in accordance with the second radio interface

standard if stations working in accordance with the first radio interface standard do not request access to the frequency band.

For reasons discussed below, we are persuaded by Petitioner that Sherman satisfies step (1) but not step (2). For step (1), Petitioner explains as follows:

Sherman teaches a Hybrid AP that supports HIPERLAN/2 and controls access for HIPERLAN/2 stations by determining when they are allowed to access the band, including the time and duration of the HIPERLAN/2 phase of the super frame. *See supra*, Element [1c]. The Hybrid AP further controls access through HIPERLAN/2's reservation system where stations must request access to the band from the AP. Ex. 1003 ¶ 170.

Pet. 28. Petitioner's assertions are supported by the cited testimony of Dr. Roy. Ex. 1003 ¶ 170. Also, Sherman describes that HIPERLAN/2 transmissions occur during a portion of the 802.11 CFP. Ex. 1004, 5:50–52. As discussed above, Sherman's hybrid AP sets the maximum length or duration of the contention free period CFP within the 802.11a protocol, between frames "B" and "E." *Id.* at 5:40–57. Patent Owner does not present any contrary argument with regard to this step (1) limitation.

For step (2), Petitioner asserts as follows:

Sherman gives priority to HIPERLAN/2 by reserving "very close to the full length of the superframe" for the CFP and then "relinquish[ing] time" for 802.11 CP access. *See* Ex. 1004, 6:1–8; Ex. 1003 ¶175. With enough traffic, HIPERLAN/2 could effectively occupy the entire superframe, precluding 802.11a access. *See id.* If no HIPERLAN/2 transmissions are requested, the AP may send the CFP at any point—it does not need to wait until the CFP max length. *See* Ex. 1004, Figure 5, 5:47-57 ("[T]he CF-End management frame [is] shown occurring at less than the maximum"); Ex. 1003 ¶¶174-176.

Pet. 29–30. Petitioner further asserts as follows:

It would have been obvious that when no HIPERLAN/2 stations request access during the CFP, the Hybrid AP does not allocate time for non-existent HIPERLAN/2 frames and instead ends the HIPERLAN/2 phase, as Sherman teaches, by sending a CF-End frame, thereby rendering the channel available for access [by] IEEE 802.11 stations during the subsequent 802.11a CP phase. *See* Ex. 1004, 6:6-8, 5:47-57, Figure 5; Ex. 1003 ¶¶174-176. Otherwise, bandwidth would be wasted in a HIPERLAN/2 phase where no HIPERLAN/2 transmissions exist and the channel remains unused. *See id.*

Pet. 30.

Petitioner's declarant, Dr. Roy, further testifies as follows:

Sherman teaches ending the HIPERLAN/2 phase (by sending a CF_End frame) if there are no pending HIPERLAN/2 requests. Sherman's protocol does not rely on a fixed duration for the HIPERLAN/2 and 802.11a phases. Instead, Sherman gives priority to HIPERLAN/2 by reserving nearly "very close" to the full superframe for HIPERLAN/2 CFP—a POSITA would have understood this to include effectively the entire superframe if there is sufficient HIPERLAN/2 traffic—and then "*relinquish[es]*" time to 802.11 CP access if no HIPERLAN/2 transmission requests are pending. *See* Ex. 1004, 6:1-8. Sherman teaches that "[t]he HIPERLAN/2 phase is viewed by 802.11 terminals as part of the CFP," whose maximum should be "optimally set very close to the full length of the superframe." *See* Ex. 1004, 6:1-6. Thus, if there is sufficient HIPERLAN/2 traffic, Sherman teaches that the HIPERLAN/2 phase may be extended to very close to the entire superframe (CFP max length), which effectively could occupy the whole superframe leaving insufficient time for 802.11 CP access, thereby precluding access by 802.11a stations.

Ex. 1003 ¶ 175 (emphasis added).

Patent Owner argues that Sherman never teaches or suggests any mechanism and/or technique for first determining whether or not any HIPERLAN/2 stations are requesting access to the frequency band, and then allocating time for use by the 802.11 stations based on this determination.

PO Resp. 20–21. We understand Patent Owner to be arguing that Sherman does not teach or suggest first determining whether or not any HIPERLAN/2 stations are requesting access to the frequency band, and then allocating time for use by the 802.11 stations based on this determination, and not that Sherman teaches that sequence of actions but just not the means to perform them.

We are unpersuaded by Petitioner’s arguments as to step (2). We find insufficient disclosure in Sherman to support Petitioner’s contentions. In essence, Petitioner is contending that Sherman’s CFP period has a variable duration which is automatically adjusted depending on whether all of the pending requests from HIPERLAN/2 stations have been serviced. The assertion is not supported by sufficient evidence. Similarly, we are not persuaded that that would have been suggested by Sherman to one with ordinary skill in the art.

First, Sherman describes that “during the CFP, all 802.11 stations will remain quiet until CFP max Interval regardless of whether the channel is occupied by a known signal.” Ex. 1004, 5:14–16. That indicates the CFP interval during which the 802.11 stations stay quiet is not automatically shortened when no HIPERLAN/2 stations request access or if all pending HIPERLAN/2 requests have been serviced. Second, Sherman discloses potentially setting the CFP “very close to the full length of the superframe,” without any reference to whether or how many HIPERLAN/2 stations are requesting access to the frequency band. Ex. 1004, 6:5–6. That indicates the CFP duration or interval is preset and not based on how many HIPERLAN/2 stations are requesting access to the frequency band.

Third, the disclosure lacks any teaching of determining whether or how many HIPERLAN/2 stations are requesting access to the frequency

band, or terminating the CFP interval, already set to a longer period, early based on such determination. Fourth, Sherman describes that “[t]he CFP occurs with a regular period.” *Id.* at 4:1–2. Without any disclosure that in the absence of pending HIPERLAN/2 requests, Sherman would cut short or prematurely terminate the already established CFP interval, the fact that Sherman operates in that manner cannot be assumed. Similarly, we are not persuaded that the same would have been suggested by Sherman to one with ordinary skill in the art.

With regard to Dr. Roy’s testimony cited by Petitioner, it is not supported by the underlying disclosure of Sherman. Dr. Roy in paragraph 175 of his Declaration (Ex. 1003) cites to column 4, lines 1–8, of Sherman, which states: “The CFP occurs with a regular period, and all 802.11 terminals set their NAV’s during the CFP. To realize such a super frame the following sequence of frames/phases can be used as shown in the graph of FIG. 5.” Ex. 1004, 4:1–5. This disclosure does not indicate, as Dr. Roy concludes, that the control station “relinquish[es]” time to 802.11 CP access if no HIPERLAN/2 transmission requests are pending. Ex. 1003 ¶ 175. We also find unpersuasive Dr. Roy’s testimony that if there is sufficient HIPERLAN/2 traffic, Sherman teaches that the HIPERLAN/2 phase may be extended to very close to the entire superframe. *Id.* As discussed above, in Sherman, the CFP already is preset, without regard to whether or how many HIPERLAN/2 requests are pending. Ex. 1004, 6:5–6. Dr. Roy’s conclusion is not supported by the disclosure of Sherman and also is not adequately explained.

In its Reply, Petitioner expressly reiterates its position that in Sherman the CFP interval is variable in length. Paper 14, 12. Petitioner refers to Sherman’s Figure 5 and asserts that Figure 5 shows the CFP period ending

early at “E” prior to reaching its maximum length. *Id.* at 12–15. Petitioner asserts that in Sherman the CFP is not the same as its maximum length, and that Sherman teaches setting CFP’s maximum length, not the CFP, “very close to the full length of the superframe.” *Id.* at 14. Petitioner’s explanation is just one way to read Figure 5. Another way to read Figure 5 is that the selectable maximum length of the CFP, as represented by the uppermost bar in Figure 5, occupies a span that can get close to the end of the superframe, and that the actual selected maximum length of the superframe, as shown in Figure 5’s embodiment, is at the location corresponding to “E.”

The reading urged by Petitioner is not consistent with Sherman’s express disclosure that “during the CFP, all 802.11 stations will remain quiet until CFP max Interval regardless of whether the channel is occupied by a known signal.” Ex. 1004, 5:14–16. That description indicates the CFP interval during which the 802.11 stations stay quiet is not automatically shortened when no HIPERLAN/2 stations request access or if all pending HIPERLAN/2 requests have been serviced. Rather, it indicates the 802.11 stations would stay quiet for the entire duration of the CFP up to the selected maximum length. Thus, we are not persuaded that Sherman discloses terminating the CFP interval early if there are no HIPERLAN/2 requests or if all HIPERLAN/2 requests have been serviced. We are also not persuaded that that would have been suggested by Sherman to one with ordinary skill in the art.

Based on the foregoing, we are not persuaded by Petitioner that Sherman discloses or would have rendered obvious step (2): “renders the frequency band available for access by the [802.11] stations working in accordance with the second radio interface standard if [HIPERLAN/2]

stations working in accordance with the first radio interface standard do not request access to the frequency band.”

The insufficient accounting by Petitioner of step (2) of claim 1, however, is inconsequential, because step (2) is a conditional step. With regard to application of conditional steps, we follow the logic and reasoning set forth in *Ex parte Schulhauser*, Appeal No. 2013–007847 (PTAB April 28, 2016) (precedential). Under *Schulhauser*, for a conditional step, if the condition is not met, then the associated action need not be performed. *Schulhauser*, at 6–7. Here, Sherman makes no reference to any circumstance in which there is no request from a HIPERLAN/2 station, and thus in Sherman, the condition is not met that *stations working in accordance with the first radio interface standard do not request access to the frequency band*. Consequently, the action corresponding to that action need not be performed. Thus, Petitioner’s failure to establish that Sherman discloses step (2) is inconsequential.

Patent Owner makes several arguments regarding our reliance on *Schulhauser*. First, Patent Owner notes that “Petitioner nowhere advanced the applicability of *Ex parte Schulhauser* to Claim 1.” PO Resp. 23. On that basis, Patent Owner asserts that the Board “should not take on the role of an advocate on behalf of the Petitioner and accord the Petitioner the benefit of *Ex parte Schulhauser*.” *Id.* Also on that basis, Patent Owner asserts that by raising *Schulhauser*, “the Board has improperly instituted an *inter partes* review outside the scope of 35 U.S.C. 314(b), as, by instituting on a ground not advanced by the Petitioner, the Board has instituted other than ‘pursuant to a petition.’” *Id.* at 23–24. Neither contention is persuasive.

It is not beyond the scope of a petition for the Board to perform claim construction and apply applicable law, even if Petitioner does not. Indeed, it

is the Board's responsibility to construe the claims, when necessary. We have not changed Petitioner's the alleged ground of unpatentability, which is obviousness over Sherman, and we have not applied any disclosure of Sherman that was not relied on by Petitioner. Likewise, construing claim terms by applying legal principles does not make the Board an advocate for Petitioner. Similarly, if the legal principles lead to a result favoring Patent Owner, that would not make the Board an advocate for Patent Owner.

Second, Patent Owner argues that *Schulhauser* applied the broadest reasonable interpretation standard to reading the claims at issue, whereas, here we use a claim construction standard based on the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. PO Resp. 25–26. But *Schulhauser*, on its face, does not limit its application to circumstances where the broadest reasonable interpretation rule applies. Further, the word “if” is conditional whether or not the broadest reasonable interpretation applies. Patent Owner does not contend that the Specification of the '676 patent specially defines the term “if” such that it has a special or unique meaning that does not denote a condition.

Third, Patent Owner argues that although *Schulhauser* involves two conditions that are mutually exclusive to each other or that represent a “branching process flow,” that is not so in the context of claim 1. *Id.* at 26–27. We do not see substantive significance in that distinction. The conditions are conditions whether or not they are mutually exclusive to each other. It is the conditional nature of “if” discussed in *Schulhauser* that matters, not the presence of two mutually exclusive conditions that represent a “branching process flow.” Even if only one condition is recited, not two complementary conditions, the corresponding action need not be performed

unless the recited condition is met. *Schulhauser*'s application is not limited to circumstances involving a branching process flow or mutually exclusive conditions.

Fourth, Patent Owner argues "it is clear that claim 1 requires a step of rendering the frequency band available for access by the stations working in accordance with the second radio interface standard in response to the condition being fulfilled that stations working in accordance with the first radio interface standard do not request access to the frequency band." *Id.* at 28–29. In making this argument, Patent Owner has rewritten the claim to be without the conditional term "if." That is inappropriate. We read the claims as they are written and are without power to rewrite them. *See SRAM Corp. v. AD-II Eng'g Inc.*, 465 F.3d 1351 (Fed. Cir. 2006), 1359; *K-2 Corp. v. Solomon S.A.*, 191 F.3d 1356, 1364 (Fed. Cir. 1999).

Fifth, Patent Owner argues that "[t]he prosecution history is clear that this recitation, formerly in dependent claim 2, was added to claim 1, and a notice of allowance subsequently issued." PO Resp. 29. The argument is vague and does not help Patent Owner, because even a conditional step limitation is a limitation that narrows a claim to which it is added. If the recited condition is met, then the added step must be performed. Patent Owner does not indicate whether the prior art applied during examination actually discloses occurrence of the claimed condition, in which case the step has to be performed to meet the claim.

In any event, Patent Owner's characterization of events is inaccurate. The circumstances in prosecution simply are that the Examiner allowed application claim 2 (Ex. 1002, 133), which includes the limitation at issue and depends from claim 1, and then the Applicant rewrote application claim 2 in independent form as claim 1 (Ex. 1002, 143). That does not show

disavowal of anything by the Applicant, much less conversion of a conditional step to a non-conditional step or effective deletion of the word “if.” Further, as noted above, we are powerless to rewrite the claim to eliminate “if.”

In its Sur-Reply, Patent Owner identifies a Board decision which purportedly construed a claim with conditional language in a method claim as “limited to the method described in which the recited conditions occur.” Paper 15, 3. We do not so construe claim 1 here and we are not bound by the cited decision which has not been designated as a precedential decision of the Board.

In its Sur-Reply, Patent Owner argues that claim 1 recites a control station which controls the alternate use of the frequency band, and the wherein clause which we construed as comprising two steps simply define how the previously recited control is to be effected. *Id.* at 3. Thus, Patent Owner asserts that “it would be erroneous to not give patentable weight to a wherein clause that meaningfully limits and further defines an expressly recited ‘control’ limitation in terms of how it must be effected.” *Id.* at 3. The argument is misplaced because, as we noted above, even a conditional step limitation narrows a claim to which it is a part. If the recited condition is met, then the corresponding action must be performed. Further, the wherein clause has been construed as requiring two steps, the first one of which is not a conditional step and must always be performed. Thus, the wherein clause has not been disregarded, as Patent Owner suggests.

Assuming that Sherman constitutes applicable prior art, *which it does not*, Petitioner has shown that the limitations of claim 1, which are incorporated into claim 3, are taught or would have been suggested by Sherman to one with ordinary skill in the art.

Claim 3 further recites “wherein the control station sends a broadcast signal informing the stations of a time duration in which the common frequency band can be used by stations working in accordance with the second radio interface standard.” Ex. 1001, 6:41–45. Petitioner explains as follows:

Sherman already discloses the AP broadcasting relevant durations to stations. *See* Ex. 1004, 6:2–5, 3:57–61 (“... transmit a spoofing frame with a duration field . . .”); Ex. 1003 ¶ 189. It would have been obvious for the Hybrid AP to likewise send a broadcast, such as “CF_End”, informing stations of the duration for 802.11a access, which allows them to know the available time and bandwidth and to recover the timing of the superframe. Ex. 1003 ¶¶ 189–190.

Pet. 34. Petitioner’s assertion is supported by the cited testimony of Dr. Roy. Ex. 1003 ¶¶ 189–190. Specifically, Dr. Roy testifies:

A POSITA [Person with Ordinary Skill In The Art] would have similarly been motivated and found it obvious to broadcast the duration for IEEE 802.11a access. For example, it would have been obvious for the Hybrid AP to broadcast the duration of IEEE 802.11a access (“n”) as part of its “CF_End” broadcast. *See* Ex. 1004, Figure 5. A POSITA would have found this advantageous for several reasons: it lets 802.11 stations know the total length of time, and thus bandwidth, available to them in this superframe; it provides redundancy and reliability, in case there is an issue with timing or transmission; it provides additional synchronization because stations may compare “n” with their own timing parameters to confirm that they match with respect to the next anticipated beacon “B”; and it allows stations to recover the timing of the superframe and beacons if they have lost synchronization.

Id. ¶ 190. We find the above-quoted testimony to be presenting cogent and rational reasoning sufficient to account for the limitation added by claim 3. Patent Owner also has not presented arguments separate from those directed to the limitations incorporated from claim 1.

Accordingly, if Sherman constitutes applicable prior art, Petitioner has proved by a preponderance of the evidence that claim 3 would have been obvious over Sherman. However, because Petitioner has not shown that Sherman constitutes applicable prior art, Petitioner has not proved that claim 3 would have been obvious over Sherman.

4. *Claim 9*

As noted above, Petitioner has not shown Sherman to be applicable prior art. Thus, Petitioner has not proved by a preponderance of the evidence that claim 9 would have been obvious over Sherman. For completeness on judicial review, we provide a substantive analysis of claim 9, *assuming* that Sherman is applicable prior art.

Claim 9 is an apparatus claim directed to a wireless network. Its structural components are the same as those recited in method claim 1, except that claim 9 recites a “wireless network” and claim 1 recites a “radio system.” That difference is inconsequential because Sherman’s radio system is a wireless network. Ex. 1004, 2:62–4:5; Fig. 1. The steps recited by claim 1 are the functions performed by the control station recited in claim 9. As such, claim 9 is the apparatus counterpart to method claim 1.

With regard to the alleged unpatentability of claim 9 over Sherman, our analysis above of the limitations of claim 1 applies equally to claim 9, except that *In re Schulhauser, supra*, applicable to a conditional step in claim 1, has no application in the context of apparatus claim 9. The analysis need not be reiterated here. We are not persuaded that Sherman discloses or would have suggested to one with ordinary skill in the art that Sherman’s hybrid Access Point would perform the function of “renders the frequency band available for access by the stations working in accordance with the

second radio interface standard if stations working in accordance with the first radio interface standard do not request access to the frequency band.” Additionally, as discussed above, Petitioner has not shown Sherman to be prior art to the challenged claims.

Accordingly, Petitioner has not shown by a preponderance of the evidence that claim 9 would have been obvious over Sherman.

5. *Claim 6*

As noted above, Petitioner has not shown Sherman to be applicable prior art. Thus, Petitioner has not proved by a preponderance of the evidence that claim 6 would have been obvious over Sherman. For completeness on judicial review, we provide a substantive analysis of claim 6, *assuming* that Sherman is applicable prior art.

As noted above, claim 6 is similar to claim 1, except for the wherein clause which we construe as setting forth a step, performed by the control station, of “*terminating the use of the radio interface in accordance with the second radio interface standard by transmitting in accordance with the first radio interface standard, without taking account of resulting interference in stations working in accordance with the second radio interface standard.*”

For the limitations that are the same as in claim 1, our analysis above in the context of claim 1 equally applies here in claim 6 and need not be reiterated. Here, we address the different step set forth in claim 6.

For this step, Petitioner argues that, like the ’676 patent, Sherman teaches that the Access Port could broadcast dummy traffic just prior to the CFP_Beacon preventing other traffic from seizing the medium. Pet. 35 (citing Ex. 1004, 6:26–28). Petitioner explains:

Sherman’s AP uses dummy traffic to terminate the use of the medium by 802.11a devices at the end of the CP, which could

otherwise spill over into the next superframe if there is Beacon jitter. *See* Ex. 1004, 6:13–32; Ex. 1003 ¶ 195. This allows the AP to regain control of the channel if 802.11a stations are still transmitting when the Beacon should be sent. Ex. 1003 ¶ 197.

Id. Petitioner further explains that by broadcasting dummy traffic just prior to the CFP_Beacon signal, the AP blocks 802.11a stations from contending for the medium, thereby terminating their use of the medium. *Id.* at 36 (citing Ex. 1004, 6:26–28; Ex. 1003 ¶ 198).

Other than the assertion that the '676 patent discloses the same technique, the assertions of Petitioner are supported by the cited disclosure of Sherman and by the cited testimony of Dr. Roy. We are not persuaded that the '676 patent discloses an embodiment using this same technique. The portion of the '676 patent cited by Petitioner refers to “dispens[ing] with sending useless (dummy) information,” not sending dummy information. Ex. 1001, 4:55–64. However, it matters not whether the '676 patent discloses the technique, but whether Sherman discloses the technique. Petitioner has shown sufficiently that Sherman does.

To satisfy the limitation of claim 6, the dummy traffic in Sherman has to be sent in accordance with the HIPERLAN/2 interface standard. Sherman does not explicitly specify any particular format for the dummy signals. In that regard, Petitioner explains:

A POSITA would have found it obvious to use HIPERLAN/2 transmissions as dummy traffic, whose purpose is simply to occupy the channel—to talk over 802.11a stations without regard to the resulting interference for those stations. Ex. 1003 ¶ 200. HIPERLAN/2 transmissions would have satisfied this purpose with the added benefit that it would appear as unintelligible, i.e., “dummy,” traffic. *See id.*

Pet. 37. We are persuaded that the format of the dummy transmissions is inconsequential because the objective simply is to have something to occupy

the medium. Notwithstanding Patent Owner's arguments to the contrary, discussed below, we are persuaded that it would have been obvious to one with ordinary skill in the art to transmit the dummy signals according to the first interface standard, i.e., HIPERLAN/2.

Patent Owner argues:

The Declarant does not explain, for example, how IEEE.802.1a devices interpret noise in the portion of the frequency spectrum used by HIPERLAN/2 transmissions. Nor does the Declarant explain the logic programmed into IEEE 802.11a devices relating to interpretation of noise in that portion of the frequency spectrum, the steps that would be carried out by IEEE 802.11a devices in determining whether the spectrum is occupied, and how HIPERLAN/2 transmissions would be interpreted.

PO Resp. 32. We see no reason why Petitioner needed to have specifically addressed how 802.11a stations distinguish purposeful communication from random noise. First, Sherman describes sending dummy packets without describing how to distinguish them from random noise. That indicates the task is within the level of ordinary skill in the art. Second, Patent Owner provides no technical witness testifying to the effect that such recognition and distinction is not within the level of ordinary skill in the art. Third, the continuous or consistent nature of dummy traffic appears readily distinguishable from random noise. For all of these reasons, the issue raised by Patent Owner does not undermine Petitioner's position and reasoning.

Patent Owner further argues that "Sherman explicitly teaches 'spoofing frames/frame sequences' including 'a CTS transmitted by an AP, a data frame transmitted by an AP,' Ex. 1004, 3:40-46, but Declarant does not provide any explanation as to why a POSITA, aware of these teachings of Sherman, would instead employ HIPERLAN/2 traffic as a dummy signal."

PO Resp. 33. The argument is misplaced for several reasons. First, the

spoofing referred to by Patent Owner pertains to what Sherman describes as prior art, not an embodiment of Sherman's invention. Second, the spoofing referred to by Patent Owner does not express the format of the spoofed data frames, i.e., whether they are in the format of 802.11 standard or a different format of a competing system contending for the same frequency band. A pertinent part of Sherman is reproduced below:

Some prior solutions to the problem of collisions between competing systems sharing a common frequency band have relied on a spoofing technique to spoof terminals into thinking that the media was busy during a time period identified by a duration field defined by the 802.11 standard.

Ex. 1004, 3:24–28. An additional pertinent part of Sherman, also in the portion of Sherman discussing prior art, states: “Possible spoofing frames/frame sequences that could be useful include a CTS transmitted by an AP, a data frame transmitted by an AP, Other frame sequences can also be used with this regard.” *Id.* at 3:40–47. None of this description pertains to Sherman's disclosed embodiment, and none specifies the format of the spoofed data frame. Patent Owner does not point out where Sherman describes the format of the spoofing data frame.

Third, contrary to Petitioner's contention, Dr. Roy has provided specific and adequate reasoning why one with ordinary skill in the art would have known to employ HIPERLAN/2 format for the dummy signals provided in Sherman's disclosed embodiment. First, Dr. Roy explains why Sherman uses dummy traffic to avoid interference:

802.11a devices practice collision avoidance and require a period of quiet before they begin transmissions. By sending dummy traffic just prior to the Beacon, the AP blocks 802.11a stations from contending for the medium—which is why it is referred to as a “Blocking Sequence”—thereby terminating their use of the medium. This allows the AP to send the next

CFP_Beacon “B” aligned with the start of the next superframe (shown on the right of Figure 5) and prevents potential spillover DCF frames (shown on the left side of Figure 5). The Beacon ends the 802.11a CP and begins a new superframe with a CFP phase.

Ex. 1003 ¶ 198. Patent Owner also states that 802.11 systems use a technique which “attempts to avoid collisions by beginning transmission only after the channel is determined to be idle.” PO Resp. 38. Dr. Roy then explains why one with ordinary skill in the art would have known to use HIPERLAN/2 transmission format for the dummy transmission:

A POSITA would have been motivated and found it obvious to use HIPERLAN/2 transmissions as the dummy traffic. The purpose of the dummy traffic is simply to occupy the medium during the CP—to talk over the IEEE 802.11a devices without regard to the resulting interference. HIPERLAN/2 transmissions would have satisfied this purpose with the added benefit that it would appear as unintelligible, i.e., “dummy,” traffic. Thus, it would have been obvious to effect Sherman’s “dummy traffic” teaching by transmitting in accordance with HIPERLAN/2, without taking into account of resulting interference in stations working in accordance with IEEE 802.11a.

Id. ¶ 200.

Fourth, even assuming that Sherman describes that its dummy traffic is in the format of the 802.11 standard, that does not undermine Petitioner’s reasoning why one with ordinary skill in the art would have known to use HIPERLAN/2 format for the dummy traffic. Dr. Roy credibly explained that one with ordinary skill in the art would have recognized that the goal is to occupy the medium and that the goal does not require transmission of dummy traffic in 802.11 format. *Id.*

Patent Owner additionally argues that Dr. Roy “does not provide an analysis of whether a POSITA would find it obvious for the AP to broadcast

802.11a signals, rather than HIPERLAN/2 signals, in order to cause other 802.11a devices to refrain from transmission.” PO Resp. 32–33. The argument is without merit, because even if using 802.11 format for the dummy traffic would have been obvious to one with ordinary skill in the art, that does not undermine Petitioner’s reasoning for why using HIPERLAN/2 format for the dummy traffic would have been obvious to one with ordinary skill in the art. Obviousness of one is not inconsistent with obviousness of the other. Petitioner need not have discussed whether using a different format for the dummy traffic would have been obvious.

Further, Patent Owner argues:

Still further, Sherman explicitly states that a disadvantage of the arrangement disclosed in Figure 3 is that the “802.11 STA would view the HIPERLAN phase as a part of the 802.11 Contention Period (CP), and would normally be free to transmit during the CP.” Ex. 1004, 3:53–56. Thus, Sherman explicitly teaches that the 802.11 devices would continue to transmit in the presence of HIPERLAN/2 traffic. A POSITA, familiar with Sherman as a whole, would clearly be motivated not to employ HIPERLAN/2 traffic as the dummy traffic, in view of this teaching.

PO Resp. 32. The argument is without merit. First, Figure 3 of Sherman illustrates what Sherman regards as prior art, not an embodiment of Sherman’s invention. Ex. 1004, 2:27–29. Unlike Figure 5, which shows an embodiment of Sherman’s invention, Figure 3 (labeled as “PRIOR ART”) shows no contention free period “CFP” including a HIPERLAN phase. The two are not the same. The description about Figure 3 does not apply to Figure 5. We are not persuaded that in Figure 5, the 802.11 STA would view the HIPERLAN/2 phase as a part of the Contention Period CP.

Second, Patent Owner has read too much into the language “and would normally be free to transmit during the CP” (Ex. 1004, 3:55–56). It

does not have to mean 802.11 devices no longer operate in the manner they normally operate, i.e., wait for an idle period before beginning transmissions (Ex. 1003 ¶ 199). Rather, it is more reasonable to read the language as meaning that the 802.11 devices are free to transmit in their usual manner. As we noted above, Patent Owner states that 802.11 systems use a technique which “attempts to avoid collisions by beginning transmission only after the channel is determined to be idle.” PO Resp. 38. Thus, we are unpersuaded that Sherman teaches that the 802.11 devices would continue to transmit in the presence of HIPERLAN/2 traffic, i.e., talking over HIPERLAN/2 traffic, even in the prior art system according to Sherman’s Figure 3.

During oral hearing, counsel for Patent Owner asked “why then you go and use the HIPERLAN/2 traffic as a dummy signal when presumably that’s the traffic that you’re then going to start using after the 802.11 traffic ceases.” Tr. 41:12–14. The question assumes that something is awry when the dummy traffic has the same format as the next phase of communication to be started. But no such problem has been articulated, either in the Patent Owner Response or at oral hearing. As explained by Dr. Roy, the purpose of sending dummy traffic simply is to occupy the medium. Ex. 1003 ¶ 200.

Accordingly, if Sherman constitutes applicable prior art, Petitioner has proved by a preponderance of the evidence that claim 6 would have been obvious over Sherman. However, because Petitioner has not shown that Sherman constitutes applicable prior art, Petitioner has not proved that claim 6 would have been obvious over Sherman.

E. Alleged Obviousness of Claims 3, 7, and 9 over Shellhammer

1. Overview of Shellhammer

Shellhammer relates to techniques for frequency coordination among two different wireless network protocols operating in proximity with one

another. Ex. 1005, Abstr. More specifically, Shellhammer teaches coordination techniques for operating Bluetooth and 802.11 enabled devices in the same frequency band at the same time. *Id.* at 2:59–62.

According to Shellhammer, a Bluetooth network consists of up to eight Bluetooth devices operating in a piconet, the piconet having one master device and up to seven slave devices. *Id.* at 7:41–43. Shellhammer recognizes that it may be desirable to operate multiple Bluetooth piconets in close proximity to each other, but notes that given the 79 different frequency channels used by Bluetooth, different Bluetooth networks are unlikely to be operating on the same frequency at the same time. *Id.* at 2:18–22.

Shellhammer points out that while communication protocols such as 802.11 and Bluetooth are designed to ensure that devices using the same protocol may operate in the same frequency band with a minimum of interference, such design considerations do not take into account a method of coordination for the use of these wireless devices in the same frequency operating under different communication protocols. *Id.* at 2:43–49.

Figure 1 of Shellhammer shows a wireless communication system and is reproduced below.

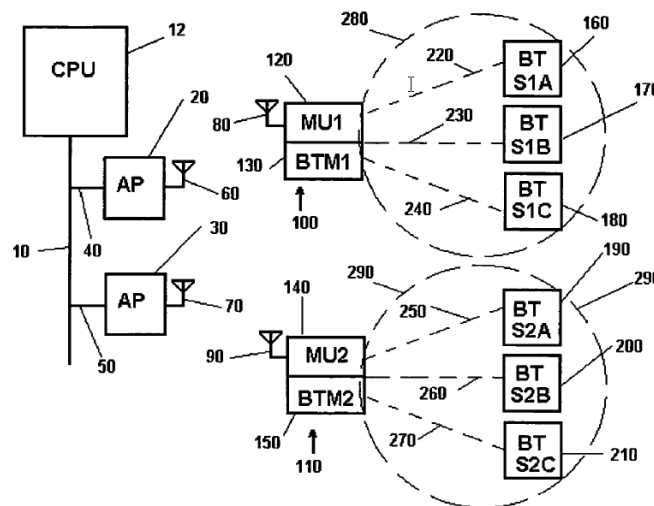


FIG. 1

Figure 1 is a block diagram of a wireless communications system using 802.11 and Bluetooth devices. *Id.* at 5:42–43.

Shellhammer describes wireless communication between access points (AP), mobile units (MU), and other devices, such as Bluetooth Slave (BTS) devices. *Id.* at 5:10–18, 5:65–6:27. For example, in Figure 1, Shellhammer discloses APs 20 and 30, MUs 120 and 130, and BTS devices 160, 170, 180, 190, 200, and 210. *Id.* According to Shellhammer, a mobile unit communicates with an access point using a first wireless communication protocol, such as 802.11, in a frequency band and also communicates with other devices using a second wireless communication protocol, such as Bluetooth, in the same frequency band. *Id.* at 5:10–18. Shellhammer discloses MUs configured as dual mode devices, such that a single MU is configured to transmit and receive RF signals associated with the 802.11 protocol as well as communicate via Bluetooth, acting as a Bluetooth Master (BTM) device. *Id.* at 6:5–15. Each BTM communicates with one or more BTS devices via the Bluetooth protocol such that each BTS is connected to a piconet uniquely associated with a BTM. *Id.* at 6:16–25. For example, Figure 1 shows BTM 130 is associated with piconet 280, which includes BTS devices 160, 170, and 180. *Id.* at 6:16–22. Likewise, BTM 150 is associated with piconet 290, which includes BTS devices 190, 200, and 210. *Id.* at 6:22–27.

According to Shellhammer, beacon signals are periodically transmitted from the AP, and such beacon signals demarcate time intervals (beacon time period T) under the 802.11 protocol. *Id.* at 3:67–4:1, 4:66–5:2, 8:54–56. A depiction of an example of a beacon time period T, for use by 802.11 and Bluetooth devices, is shown in Figure 3 of Shellhammer, reproduced below.

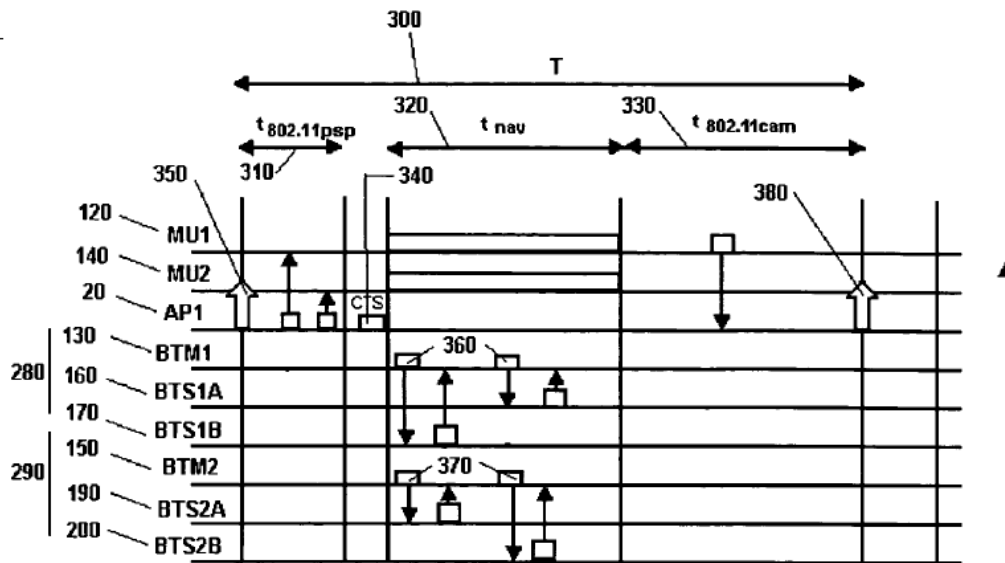


FIG. 3

Figure 3 is a schematic diagram of an embodiment of Shellhammer illustrating operations of 802.11 and Bluetooth devices. *Id.* at 5:49–51.

Shellhammer explains that each beacon time period may be divided into three time intervals: 1) 802.11 communications in the power saving (PSP) mode ($t_{802.11PSP}$), 2) Bluetooth communications (t_{NAV}), and 3) 802.11 communications in the active (CAM) mode ($t_{802.11CAM}$). Examples of the respective time periods are shown in the graph of Fig. 3 relative to beacon time period T. *Id.* at 8:55–59. According to Shellhammer, the durations of $t_{802.11PSP}$, t_{NAV} , and $t_{802.11CAM}$ may depend on traffic characteristics and application needs. *Id.* at 8:59–61.

During the first time period ($t_{802.11PSP}$ 310), 802.11 PSP devices receive and transmit packets according to the 802.11 protocol. *Id.* at 8:61–9:3. For the second time period (t_{NAV} 320), the AP sends a CTS signal to shut down all the 802.11 communications for a NAV (Network Allocation Vector) period, and Bluetooth piconets begin communications. *Id.* at 8:67–9:7. After completion of the NAV period 320, BTM radios are disabled and all

Bluetooth communications cease. *Id.* at 9:8–13. The rest of the time until the next beacon T ($t_{802.11CAM}$) is dedicated for 802.11 Continuously Aware Mode (CAM) MUs that operate according to the 802.11 protocol. *Id.* at 9:10–13.

2. *Claim 3*

Claim 3 depends from claim 1. We begin by discussing the limitations incorporated from claim 1.

Claim 1 recites “[a]n interface-control protocol method for a radio system which has at least one common frequency band that is provided for alternate use by a first and a second radio interface standard.” Ex. 1001, 6:20–23. Claim 1 further recites that the radio system comprises “stations which operate in accordance with a first radio interface standard and/or a second radio interface standard.” *Id.* at 6:24–26.

Petitioner asserts that Shellhammer discloses a frequency band (which may be the 2.4 GHz ISM band) being used by IEEE 802.11 and Bluetooth protocols, operating in proximity with one another. Pet. 47 (citing Ex. 1005, Abstr., 1:32–39, 1:13–20, 1:61–62, 2:28–31, 2:59–62). Petitioner further asserts that one of ordinary skill in the art would have understood that wireless communications in the ISM band utilized radio systems. *Id.* at 48 (citing Ex. 1003 ¶ 252). The assertions are supported by the cited disclosure of Shellhammer as well as the cited testimony of Dr. Roy.

Petitioner identifies Shellhammer’s APs and MUs as stations operating according to IEEE 802.11 protocol, i.e., *a first radio interface standard*, and Shellhammer’s BTM devices and BTS devices as stations operating according to Bluetooth protocol, i.e., *a second radio interface standard*. Pet. 48–50 (citing Ex. 1005, 5:65–6:32). Petitioner’s assertions are supported by the cited disclosure of Shellhammer. Shellhammer teaches

APs and MUs configured for the transmission and reception of radio frequency signals under the 802.11 protocol as well as BTM devices and BTS devices configured for communication via Bluetooth. Ex. 1005, 5:65–6:27.

Patent Owner does not dispute Petitioner’s above-identified assertions. We are persuaded that Shellhammer discloses a radio system which has at least one common frequency band that is provided for alternate use by a first and a second radio interface standard, and that Shellhammer discloses stations which operate in accordance with a first radio interface standard and/or a second radio interface standard.

Claim 1 further recites that the radio system comprises “a control station which controls the alternate use of the frequency band.” Ex. 1001, 6:27–28. Petitioner identifies Shellhammer’s AP as a control station which controls the alternate use of the frequency band. Pet 52–55 (citing Ex. 1005, Fig. 3, 8:52–9:23). Petitioner asserts that Shellhammer confirms the AP controls its alternating intervals because the access point conducts communications during each interval, and that the AP transmits periodic beacon signals and global clear to send signals that control the alternating intervals and prevent mobile units from transmitting signals using the first data communications protocol during an allocated time interval. Pet 53 (citing Ex. 1005, 3:67–4:6, 4:12–21, 8:52–9:13; Ex. 1003 ¶¶ 270–271). Petitioner’s assertions are supported by the cited disclosure of Shellhammer as well as the cited testimony of Dr. Roy.

Patent Owner does not dispute the above-identified assertions of Petitioner. We are persuaded that Shellhammer discloses a control station which controls the alternate use of the frequency band.

Claim 1 further recites a wherein clause which, as explained above in Section II.C., sets forth two steps:

(1) controls access to the common frequency band for stations working in accordance with the first radio interface standard, and

(2) renders the frequency band available for access by the stations working in accordance with the second radio interface standard if stations working in accordance with the first radio interface standard do not request access to the frequency band.

For step (1), Petitioner explains that Shellhammer teaches the AP controlling access to the common frequency band for stations working in accordance with 802.11 by determining when 802.11 stations are allowed to access the band, including sending beacons and CTS signals to control the 802.11 PSP interval ($t_{802.11PSP}$) and to prevent 802.11 stations from transmitting during certain intervals, citing its previous accounting for the limitation of “a control station which controls the alternate use of the frequency band” and the testimony of Dr. Roy (Ex. 1003 ¶ 280). Pet. 56. Petitioner’s assertions are supported by the cited disclosures of Shellhammer and its previous accounting of the limitation of “a control station which controls the alternate use of the frequency band.” With regard to step (1), Patent Owner has not presented a counter-argument. We are persuaded by Petitioner that Shellhammer discloses step (1).

For step (2), Petitioner states that “Shellhammer teaches that the duration of the 802.11 PSP interval ($t_{802.11PSP}$) is not fixed and instead depends on ‘traffic characteristics.’” Pet. 58 (citing Ex. 1005, 8:59–61). Specifically, Petitioner explains as follows:

Shellhammer teaches dividing each beacon time period T into either two or three intervals. Ex. 1003 ¶282; *supra*, Element [1c]. In either scenario, the beacon time period begins with an

interval IEEE 802.11 PSP stations. Ex. 1005, 8:61-64 (“At the beginning of each beacon period 300, AP 20 sends a beacon signal 350 to the 802.11 PSP MU's 120, 140 that wake up in this period ...”); Ex. 1003 ¶282. “During this period the PSP MU's 120, 140 receive and transmit their packets according to the 802.11 protocol. **Once all the PSP MU's 120, 140 receive their packets, the AP 20, may optionally send a global Clear to Send (CTS) signal 430** to shut down all the 802.11 communications for a NAV (Network Allocation Vector) period.” Ex. 1005, 8:65-9:8 (emphasis added). The CTS begins the second interval, rendering the frequency band available for access by Bluetooth stations, which “may begin BT communications.” See Ex. 1005, 8:65-9:8, 6:39-43 (“... In one embodiment, the Bluetooth systems are enabled or disabled according to a global/central signal from the 802.11 AP as described herein. ...”), 4:62-5:9; Ex. 1003 ¶283.

Pet. 56–57. Petitioner additionally explains:

Shellhammer teaches that the CTS signal may be sent “once” all PSP MUs have received their packets, i.e., once there are no longer any pending transmission requests. See Ex. 1005, 8:65-9:8. If no 802.11 stations (including the AP) request access to the frequency band during the $t_{802.11PSP}$ interval—for example by contending for the medium—then there would be no transmissions, and it would have been obvious for the AP to send the CTS signal, thereby rendering the frequency band available for access by Bluetooth stations. Ex. 1003 ¶¶ 284-286.

Indeed, Shellhammer teaches that the duration of the 802.11 PSP interval ($t_{802.11PSP}$) is not fixed and instead depends on “traffic characteristics.” See Ex. 1005, 8:59–61 (“**The duration of time intervals T , $t_{802.11PSP}$, t_{NAV} , and $t_{802.11CAM}$ depend on traffic characteristics and application needs ...**”); Ex. 1003 ¶¶ 284–285. A POSITA would have recognized that this sort of variable duration would have (a) fit well with IEEE 802.11's DCF, (b) been consistent with the 802.11 RTS/CTS protocol, which was intended to facilitate dynamic resource allocation, and (c) boosted bandwidth efficiency by allowing Bluetooth stations to utilize the frequency band, rather than letting it sit idle since no 802.11 stations were utilizing the band. Ex. 1003 ¶¶ 285–296, 266 n.7.

Pet. 57–58 (emphasis added).

Patent Owner presents seven arguments with respect to the step (2) limitation of claim 1 and Shellhammer. PO Resp. 45–48. Notwithstanding those arguments, which we address below, we are persuaded by Petitioner that step (2) in claim 1 would have been obvious to one with ordinary skill in the art. Petitioner’s arguments are cogent and rational, and also supported by the cited disclosure of Shellhammer and the cited testimony of Dr. Roy. Patent Owner’s arguments are not sufficiently persuasive to undermine Petitioner’s contentions.

First, Patent Owner argues that “given the numerous different embodiments described in brief overview by Shellhammer, a POSITA would not read precise teachings into these statements.” *Id.* at 45. By “these statements,” Patent Owner is referring to Shellhammer’s statement that “[o]nce all the PSP MU’s 120, 140 receive their packets, the AP 20, may optionally send a global Clear to Send (CTS) signal 430 to shut down all the 802.11 communications for a NAV (Network Allocation Vector) period” (Ex. 1005, 8:65–9:8), and Shellhammer’s statement that “[t]he duration of time intervals T , $t_{802.11PSP}$, t_{NAV} , and $t_{802.11CAM}$ depend on traffic characteristics and application needs (e.g., time critical services)” (Ex. 1005, 8:59–61). PO Resp. 44.

The argument does not undermine Petitioner’s persuasive showing. That Shellhammer discloses numerous other embodiments does not detract from what the one embodiment identified by Petitioner would have revealed to one with ordinary skill in the art. Indeed, a prior art reference must be considered for everything it teaches by way of technology and is not limited to the particular invention it is describing and attempting to protect. *EWP Corp. v. Reliance Universal Inc.*, 755 F.2d 898, 907 (Fed. Cir. 1985).

Moreover, what Petitioner relies on here is an embodiment of Shellhammer's invention.

Patent Owner also phrases its argument as follows: because "Shellhammer teaches general descriptions of various embodiments," one with ordinary skill in the art "would not attempt to read details into those embodiments." PO Resp. 45. We know of no authority that supports Patent Owner's position. We also disagree with the contention. What a reference would have disclosed is not determined with a pre-conceived goal of trying to read more or less detail into the prior art disclosure. Further, Petitioner's assertion here is one not based on anticipation, but obviousness. It is misplaced for Patent Owner to characterize Petitioner's effort as an "attempt to read details into those embodiments."

Second, Patent Owner asserts that there are alternative ways to satisfy the interval duration depending on traffic characteristics and application needs, such as setting the $t_{802.11PSP}$ interval sufficiently long to allow complete transmission of all messages by PSP MU's. *Id.* The argument is misplaced because the existence of other alternatives, perhaps equally obvious, do not detract from obviousness of the option discussed by Petitioner. Petitioner need only discuss that option which meets the claim limitation at issue. Petitioner's argument is not deficient on the basis that Petitioner did not discuss options which do not meet the claim limitation.

Third, Patent Owner argues that, potentially, if the PSP MU's in Shellhammer continued to transmit after occurrence of the CTS signal and during the NAV period, that could cause a problem not addressed by Petitioner. PO Resp. 45–46. The argument is misdirected because, by definition, the CTS signal shuts down all 802.11 communications for the NAV period. Shellhammer expressly states that "[o]nce all PSP MU's 120,

140 receive their packets, the AP 20, may optionally send a global Clear to Send (CTS) signal 430 to shut down all the 802.11 communications for a NAV (Network Allocation Vector) period.” Ex. 1005, 8:67–9:3. The situation referred to by Patent Owner is internally inconsistent and contradicts its basic premise. Patent Owner has presented no persuasive reason why one with ordinary skill in the art would expect such a situation would occur and be expected to devise a solution. Patent Owner also does not contend that one with ordinary skill in the art would not have had sufficient skills to address the matter. We further find that Petitioner need not have accounted for this speculative outcome.

Fourth, Patent Owner argues that “the disclosure in Shellhammer that the duration of the time intervals may depend on traffic characteristics and application needs, such as time critical services, does not require variable lengths of time periods at all.” PO Resp. 46. Patent Owner asserts that the disclosure likely suggests selecting a fixed time interval according to those needs. *Id.* Patent Owner further argues that even if variable intervals are suggested, “Petitioner and Petitioner’s Declarant have not offered any formula which so much as take into account the factor of ‘time critical services.’” *Id.* These arguments are misplaced. The existence of other ways of implementing the described dependency, which do not meet the claim, does not detract from or undermine Petitioner’s proposed combination. It is not the law that whatever would have been deemed obvious to one with ordinary skill in the art must be required by prior art disclosure. It is also not the law that if the prior art suggests more than one solution, Petitioner may not rely on the one that meets the claim. Further, the claim limitation does not require a more specific formula on how to calculate interval lengths, much less how to calculate interval lengths based

on time critical services. Additionally, Petitioner relies on Shellhammer's discussion on interval duration depending on traffic characteristics, not application needs. Pet. 58.

Fifth, Patent Owner disputes Petitioner's assertion (Pet. 58) that a variable 802.11 transmission interval based on traffic characteristics, such as allowing Bluetooth stations to utilize the common frequency band when no 802.11 stations use the band, boosts bandwidth efficiency. PO Resp. 46–47. Patent Owner contends that “unless there were some reason to believe that the Bluetooth communications could not be accommodated in the Bluetooth time slot, a possibility nowhere mentioned by the Declarant, there is no efficiency gained by starting the Bluetooth time slot earlier with a fixed beacon time period.” *Id.* at 47. The argument does not undermine Petitioner's persuasive showing. The possibility always exists that whatever period made available for Bluetooth stations are not enough to accommodate all Bluetooth transmission requests and need not be expressly noted by Petitioner. Allowing Bluetooth stations to access the common frequency band as soon as all 802.11 stations are finished with their communications does in fact boost bandwidth efficiency, by leaving more time for the Bluetooth stations to communicate. Petitioner notes that using idle bandwidth is more efficient than wasting it. Reply 26. We agree.

Patent Owner asserts that “[m]oreover, the Declarant [Dr. Roy] does not address the fact that these time periods are all within a fixed beacon time period, thus demonstrating the incomplete and conclusory nature of Declarant's testimony.” PO Resp. 47. The argument itself is vague, as it does not explain how the fixed beacon period affects any testimony of Dr. Roy. It is not known what testimony is allegedly incomplete and what

testimony is allegedly conclusory. Dr. Roy's explanation regarding boosting bandwidth efficiency is reproduced below:

Given Shellhammer's teachings, if no 802.11 stations (including the AP) request access to the frequency band during the $t_{802.11PSP}$ interval—for example by contending for the medium—then it would have been obvious to a POSITA for the AP to determine after a short amount of time, such as a multiple of DIFS intervals without activity, that no packets or transmission requests were pending. It would then have been obvious for the AP to send the CTS signal, rendering the frequency band available for access by Bluetooth stations. Sending the CTS at that time would have boosted bandwidth efficiency by allowing Bluetooth stations to utilize the frequency band, since the 802.11 stations were not requesting access to utilize the medium, rather than letting the frequency band sit idle.

Ex. 1003 ¶ 286. We find it sufficiently complete and non-conclusory.

Sixth, Patent Owner argues: “[T]he Petitioner’s analysis fails to acknowledge that the Bluetooth time slot proceeds even if the 802.11 Continuously Aware Mode (CAM) MU’s that operate according to the 802.11 protocol, Ex. 1005, 9:10–14, have unsent messages and are in need of access to the frequency band.” PO Resp. 47. Patent Owner asserts that “[n]either the Declarant nor the Petition attempt to reconcile this denial of access to the frequency band with the Petitioner’s attempt to read the teachings of Shellhammer onto the pertinent recitations.” *Id.*

As Petitioner has noted, however, the provision for a $t_{802.11CAM}$ interval is optional. Reply 26 (citing Ex. 1005, 9:19–23). Shellhammer states: “In a further embodiment, the $t_{802.11CAM}$ 330 time interval may be eliminated if the MUs do not operate in CAM mode. Here, the CTS signal 340 would trigger only t_{NAV} 320 and $t_{802.11PSP}$ 310 time intervals for every 802.11 beacon period T 300.” Ex. 1005, 9:19–23. Thus, the $t_{802.11CAM}$ interval is not required and that provides a complete response to Patent Owner’s contention. Further,

even in an embodiment with a $t_{802.11CAM}$ interval, the issue raised by Patent Owner appears non-existent or simply not supported by this record. Patent Owner provides no declaration testimony explaining the existence of such unsent messages. Patent Owner also cites to nothing in Shellhammer which refers to any accumulation of unsent messages. Further, in Shellhammer, the CTS signal is sent and the t_{NAV} period is entered when all 802.11 stations are finished with their transmissions. Ex. 1005, 8:65–9:8. That indicates to one with ordinary skill in the art, if there were unsent messages which have accumulated, they would have been serviced as well prior to entering the t_{NAV} period.

Seventh, Patent Owner asserts that Shellhammer does not provide for advancing to the Bluetooth communications interval t_{NAV} from the 802.11 power saving (PSP) interval $t_{802.11PSP}$ “only in the event” that 802.11 stations are not requesting access to the frequency band medium. PO Resp. 47–48. According to Patent Owner, regardless of whether 802.11 stations are, or are not, still requesting access to the frequency band, the control station of Shellhammer will activate the Bluetooth communications interval t_{NAV} following the 802.11 power saving (PSP) interval $t_{802.11PSP}$. *Id.* at 48. Patent Owner’s argument is misplaced for two reasons: (1) claim 1 does not require allowing access by second interface standard stations “only in the event” that first interface standard stations do not request access; (2) the circumstance Patent Owner refers to, i.e., entering t_{NAV} at a certain time regardless of which stations are or are not requesting access, has been modified by Petitioner’s reasoning as discussed in detail above.

Patent Owner also argues that although Shellhammer does teach that the duration of the time intervals $t_{802.11PSP}$, t_{NAV} , and $t_{802.11CAM}$ may depend on traffic characteristics and application needs, Shellhammer “never teaches

that either of the 802.11 power saving (PSP) interval $t_{802.11PSP}$ or Bluetooth communications interval t_{NAV} , would, or would not be used, based upon the existence or non-existence of requests present at the other time interval.” *Id.* The argument is misplaced because Petitioner’s alleged ground of unpatentability based on Shellhammer is not anticipation but obviousness. Express disclosure in Shellhammer of the limitation at issue is not required. Shellhammer teaches that the durations of time intervals $t_{802.11PSP}$, t_{NAV} , and $t_{802.11CAM}$ depend on traffic characteristics. Ex. 1005, 8:59–62. That teaching gives strong support for Petitioner’s obviousness contentions, reproduced above, including that if no 802.11 station requests access to the frequency band during the $t_{802.11PSP}$ interval, then send the CTS signal to render the frequency band available for access by Bluetooth stations in a t_{NAV} period.

For the foregoing reasons, Petitioner has shown that all of the limitations from claim 1 are taught or would have been suggested by Shellhammer to one with ordinary skill in the art.

Claim 3 further recites “wherein the control station sends a broadcast signal informing the stations of a time duration in which the common frequency band can be used by stations working in accordance with the second radio interface standard.” Ex. 1001, 6:41–45. Petitioner explains:

The AP [of Shellhammer] initiates t_{NAV} interval by “send[ing] a global Clear to Send (CTS) signal 430 to shut down all the 802.11 communications for a NAV (Network Allocation Vector) period”. Ex. 1003 ¶ 295; *see* Ex. 1005, 9:1–3. The 802.11 standard defines a variable field in the CTS frame for the NAV period. Ex. 1003 ¶ 297. It would have been obvious for the AP to determine the length of the NAV period and include it in the CTS broadcast signal. Ex. 1003 ¶¶ 295–296. The NAV period is the duration when Bluetooth stations may use the band.

Pet. 61. Petitioner’s assertion is supported by cited disclosure of Shellhammer and the cited testimony of Dr. Roy. Dr. Roy testifies:

The AP initiates t_{NAV} interval by “send[ing] a global Clear to Send (CTS) signal 430 to shut down all the 802.11 communications for a NAV (Network Allocation Vector) period.” *See* Ex. 1005, 9:1–3; *supra* n. 9. A POSITA would have understood this to refer to the IEEE 802.11 NAV mechanism, which is defined in the standard as a variable field in the CTS frame that tells stations to turn off their transmissions for the period specified in the field. The NAV is defined in the standard to be a variable field. Shellhammer teaches each 802.11 stations setting its NAV to shut down communications for a duration, so that Bluetooth stations may use the frequency band. Thus, it would have been obvious from Shellhammer’s teachings for the AP to determine the length of the NAV period and include it as the NAV field in the CTS broadcast signal.

Id. ¶ 295. We find the above-quoted testimony to be cogent and rational and sufficient to account for the limitation added by claim 3. Patent Owner has not presented arguments directed to claim 3, which are separate from those it has presented for claim 1, and we have already rejected those arguments above in the discussion of the limitations from claim 1.

For the foregoing reasons, Petitioner has shown by a preponderance of the evidence that claim 3 would have been rendered obvious by Shellhammer to one with ordinary skill in the art.

3. *Claim 9*

Claim 9 is an apparatus claim directed to a wireless network. Its structural components are the same as those recited in method claim 1, except that claim 9 recites a “wireless network” and claim 1 recites a “radio system.” That difference is inconsequential because Shellhammer’s radio system is a wireless network. Ex. 1005, 2:66–3:11; 3:37–52; Fig. 1. The steps recited by claim 1 are the functions performed by the control station

recited in claim 9. As such, claim 9 is the apparatus counterpart to method claim 1.

With regard to the alleged unpatentability of claim 9 over Shellhammer, our analysis above of the limitations of claim 1 applies equally to claim 9. The analysis need not be reiterated here. For the same reasons discussed above for claim 1, Petitioner has shown by a preponderance of the evidence that claim would have been rendered obvious by Shellhammer to one with ordinary skill in the art.

4. *Claim 7*

Claim 7 recites as follows:

7. An interface-control protocol method for a radio system which has at least one common frequency band that is provided for alternate use by a first and a second radio interface standard, the radio system comprising:

stations which operate in accordance with a first radio interface standard and/or a second radio interface standard, and

a control station which controls the alternate use of the frequency band,

wherein the control station controls the access to the common frequency band by stations working in accordance with the first radio interface standard and in that duration and type of control of the radio interface in accordance with the second radio interface standard is determined by a further station and transmitted to the control station.

Ex. 1001, 7:4–19. According to claim 7, although the control station controls alternate access to the frequency band by first radio interface standard devices and second radio interface standard devices, the control information directed *to second radio interface standard devices* “is determined by a further station and transmitted to the control station.”

To satisfy that requirement, Petitioner asserts that Shellhammer teaches a further embodiment in which alternate access to the frequency band is controlled by “a coordinator associated with the base station.” Pet. 62 (citing Ex. 1005, 2:66–3:11). The assertion, even if true, is insufficient to satisfy the limitation at issue. That is because claim 7 still requires “the control station” itself to control access to the common frequency band by stations working in accordance with the first radio interface standard.

The cited portion of Shellhammer describes as follows:

An embodiment of the present invention includes a first radio transceiver operating in accordance with a first communication protocol which may be the 802.11 protocol) and using a frequency band (which may be the 2.4 GHz ISM band), a base station operating in accordance with the first communication protocol, a second radio transceiver operating in accordance with a second communication protocol (which may be the Bluetooth protocol) and using the frequency band, *and a coordinator associated with the base station for, in turn, activating the first radio transceiver, deactivating the first radio transceiver, activating the second radio transceiver, and deactivating the second radio transceiver.*

Ex. 1005, 2:66–3:11 (emphasis added). Petitioner regards the referenced “coordinator associated with the base station” as the further station recited in claim 7, some unit other than the base station itself. Based on that reasoning, it follows then that according to this embodiment of Shellhammer, even access by the first radio interface standard devices would be controlled by this further station and not by the base station as is required by claim 7.

Further, claim 7 requires control information to be sent from the “further station” to the control station. Petitioner does not account for that requirement. The cited text reproduced above does not describe that any

control information is sent from the coordinator associated with the base station to the base station. Similarly, although Petitioner asserts that it would have been obvious to one with ordinary skill in the art to use Shellhammer's CPU as this coordinator associated with the base station (Pet. 63), Petitioner does not explain why the CPU has to send pertinent control information to the base station for indirect transmission to the controlled devices.

We articulated the above analysis in the Decision on Institution. Paper 9, 46–48. In its Reply, Petitioner did not present any rebuttal directed to our analysis of the arguments in the Petition with respect to claim 7. When asked to explain how Shellhammer's "coordinator" accounts for the limitations of claim 7, counsel for Petitioner stated: "Well, Your Honor, we read the institution decision and your analysis of the coordinator there. And we aren't disputing that analysis from the institution decision. And we -- and as explained in the reply briefing, we are no longer relying on that citation to the coordinator." Tr. 16:23–26. Thus, the argument in the Petition for claim 7 is unpersuasive.

Instead, in its Reply, Petitioner presents a new argument with respect to claim 7, dropping its original argument based on the referenced "coordinator" entirely. Reply 27–30. Specifically, Petitioner asserts:

A POSITA would have found it obvious for CPU 12 to coordinate the APs because its central connectivity (shown in Fig. 1) makes it optimally suited to coordinate timing and control between multiple APs by determining and then transmitting the duration and type of control to the APs. Ex. 1003 ¶ 304. Therefore a POSITA would have found it obvious for CPU 12 to coordinate information such as the duration and type of control of the interface in accordance with the second radio interface standard (e.g., Bluetooth), including transmitting such information to the APs in the system. Ex. 1003 ¶ 304.

Reply 28–29 (footnote omitted). That is substantively a new argument, because the thrust of the argument is no longer the same as that of the argument first presented in the Petition.

The initial argument first identified Shellhammer’s described “coordinator” and the functions performed by that “coordinator,” and then proposed to implement that “coordinator” and its functions by Shellhammer’s CPU. Pet. 62–63. The Reply argument, however, jettisons Shellhammer’s described coordinator and, instead, proposes to use Shellhammer’s CPU (1) to perform a function not expressed by Shellhammer as performed by the coordinator, and (2) not to perform a function that is performed by the coordinator. The added function is the sending of control information from the claimed further station to the claimed control station, and the removed function is the control by the coordinator of the first radio interface standard devices.

In the Reply, Petitioner states: “The Petition’s citation to the discussion of a “coordinator” in Shellhammer was intended as a general suggestion to modify the teachings, while Dr. Roy’s declaration provided the more detailed explanation on why a POSITA would have modified Shellhammer’s teachings based on the central role of CPU 12 in Figure 1. *See* Ex. 1003 ¶ 304.” Reply 29 n. 7. The argument is misplaced as well as unpersuasive. It is misplaced because neither Patent Owner nor the Board reasonably can be expected to speculate on Petitioner’s intent, if that intent is not reflected by the actual argument, as here. It is unpersuasive because the argument expressed in the Petition, as discussed above, is not general but specific in its reasoning, i.e., note Shellhammer’s “coordinator,” and implement Shellhammer’s “coordinator” with Shellhammer’s CPU.

Thus, the new argument first presented in the Reply is not

entitled to consideration. *See* 37 C.F.R. § 42.23(b); *Intelligent-BioSystems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369–70 (Fed. Cir. 2016). Petitioner has not shown by a preponderance of the evidence that claim 7 would have been obvious over Shellhammer.

F. Alleged Obviousness of Claim 8

Petitioner alleges that claim 8 is unpatentable on three separate grounds: (1) Sherman and Trompower; (2) Shellhammer and Trompower; and (3) Shellhammer and Panasik. A meaningful review of those grounds cannot be performed because, as we explained below, claim 8 has ambiguous claim scope, and it is unclear what is covered by claim 8. Claim 8 reads as follows:

8. An interface-control protocol method for a radio system which has at least one common frequency band that is provided for alternate use by a first and a second radio interface standard, the radio system comprising:

stations which operate in accordance with a first radio interface standard and/or a second radio interface standard, and

a control station which controls the alternate use of the frequency band,

wherein the control station, in addition to functions in accordance with the second radio interface standard, also carries out functions which cause *radio systems in accordance with the second radio interface standard to interpret the radio channel as interfered and to seize another radio channel for its own operation.*

Ex. 1001, 7:20–8:6 (emphasis added). The emphasized text also appears in claim 5 which is reproduced below, except that it refers to “in accordance with the second radio interface standard” rather than “in accordance with the first radio interface standard” as in claim 5. Claim 5 is reproduced below:

5. The method as claimed in claim 1, wherein the control station also carries out functions which cause radio systems in accordance with the first radio interface standard to interpret the radio channel as interfered and to seize another radio channel for its own operation.

Ex. 1001, 6:51–55. In IPR2019-01125, we determined that claim 5 has ambiguous claim scope and it is unclear what is covered by claim 5.

IPR2019-01125, Paper 8, 16. We declined to institute *inter partes* review on that basis. *Id.* at 17. For similar reasons as we expressed in IPR2019-01125 regarding claim 5, in our view the scope of claim 8 is ambiguous. Our reasoning is essentially the same as that expressed with regard to claim 5 in the decision declining to institute *inter partes* review in IPR2019-01125.

In the Decision on Institution, we determined that claim 8 has ambiguous claim scope and that it is unclear what is covered by claim 8. Paper 9, 49. We also concluded that “to make sense of claim 8 we would have to engage in impermissible rewriting of the claim.” *Id.* at 52. We have no reason to deviate from that analysis, notwithstanding Patent Owner’s argument to the contrary, as discussed below.⁹

Claim 8 specifically refers to “radio systems” in plural. The only “radio system” that has been defined or otherwise set forth, however, is that radio system earlier recited in the claim, which includes stations that operate in accordance with a first radio interface standard and/or a second radio interface standard. *Id.* at 7:23–36. Further, given that that radio system includes stations which operate in accordance with a first and/or a second

⁹ In its Reply, Petitioner states that it agrees with the Board’s determination that claim 8 has ambiguous claim scope and points out that Patent Owner’s arguments are merely “raw attorney argument, citing no evidence or expert testimony.” Reply 30.

radio interface standard, it cannot be referred to simply as a radio system “in accordance with the first radio interface standard.”

If the term at issue were not “radio systems” but “stations,” the language would be understandable because claim 8 cites to multiple stations that may operate in accordance with a first radio interface standard. But the term here is “radio systems,” and “radio system” and “station” are not used interchangeably in the context of claim 8. Also, in the context of the Specification, the terms “radio system” and “station” are not used interchangeably. Indeed, the Specification states the following:

The radio system comprises one or more stations. The stations may be, for example, computers of a wireless local area network. These stations may be arranged, for example, only for operation in accordance with a first or second radio interface standard. But it is also possible for stations to operate in accordance with both the first and the second radio interface standard.

A first number of stations preferably forms a wireless local area network in accordance with a first radio interface standard and a second number of stations forms a wireless network in accordance with a second radio interface standard. The first radio interface standard may be, for example, the HiperLAN/2 standard and the second radio interface standard may be the IEEE802.11a standard.

Id. at 2:29–42. Thus, within the context of both the claim and the Specification, a radio system and a station are not the same. It is unclear what is referred to by the reference in claim 8 to “*radio systems in accordance with the second radio interface standard.*”

We have reviewed the Specification and find nothing to give sufficient meaning to the recited phrase in the context of claim 8. The recited “radio systems” appear to be extraneous to the claim. Their role, identity, and interaction with the rest of the claim are all uncertain. For

example, although the claim recites that these radio systems can interpret the radio channel as interfered, it is uncertain whether it is the communications of those radio systems or the stations defined in claim 8 that are interfered. It is even uncertain whether the “radio systems” make any transmission over the common frequency band. In short, it is uncertain what the “radio systems” are within the structural organization of claim 8.

We also do not think “radio systems” read on the stations defined in claim 8. As discussed above, within the structural organization of claim 8, a station is different from a radio system in that a station is contained within a radio system. The Specification describes the same. Ex. 1001, 2:29. Further, the Specification consistently does not refer to a “station” as a “radio system.” In the context of claim 8, and in light of the Specification, there is but just one radio system, the one that includes the stations of claim 8. Even when viewed with a lenient eye, it would be uncertain whether “radio systems” read on the stations defined in claim 8.

There also is uncertainty with regard to the recitation “for its own operation” at the end of claim 8. This phrase is too remote from the control station recited at the beginning of claim 8 to be referring to the control station, and the Specification appears not to support such a reading. We find no specific example in the Specification of any radio channel seized by another device “for use by the control station.” Further, although the phrase is proximate to the recited action of the “radio systems,” the word “its” does not agree, in number, to plural “radio systems.” Thus, the source or origin of the “it” in “its” is uncertain. We do not know what the “it” is that forms the basis for the possessive pronoun “its.”

We conclude that to make sense of claim 8 we would have to engage in impermissible rewriting of the claim. In patent law, “the name of the

game is the claim.” *In re Hiniker Co.*, 150 F.3d 1362, 1369 (Fed. Cir. 1998). We read the claims as they are written, and are “powerless to rewrite the claims.” *SRAM Corp.*, 465 F.3d at 1359; *see also K-2 Corp.*, 191 F.3d at 1364 (“Courts do not rewrite claims; instead, we give effect to the terms chosen by the patentee.”). We know of no authority suggesting that if a claim as written does not make sense, then we are to rewrite it, in the name of claim construction, to eliminate the problem.¹⁰

In the Petition, Petitioner acknowledges that the language of claim 8 is unclear, but states as follows: “While the precise contours are unclear, for purposes of this IPR, the limitation would at least include ‘*two or more stations which operate in accordance with a first radio interface standard.*’” Pet. 17 (citing Ex. 1003 ¶ 100). Dr. Roy does not explain in his testimony why it is that “radio systems” at least includes two or more stations which operate in accordance with a first radio interface standard. Ex. 1003 ¶ 100. Neither does Petitioner. As we explained above, if the claim were rewritten to refer to “stations” rather than “radio systems,” the claim would make more sense. That is not, however, a justification to rewrite the claim in that way.

Petitioner also asserts that “[t]he grounds [challenging claim 8] in this Petition satisfy all proposed constructions.” Pet. 15. By “all proposed constructions,” Petitioner appears to be additionally referring to the construction proposed by the petitioner in IPR2019-01125. *Id.* at 17;

¹⁰ We recognize that in limited circumstances, clear errors in claims can be corrected. *See Novo Indus., L.P. v. Micro Molds Corp.*, 350 F.3d 1348, 1354 (Fed. Cir. 2003). The deficiency in the claim language here clearly does not meet that standard. What the Applicant for patent intended by the language used is subject to much speculation and conjecture.

Ex. 1003 ¶ 110. That argument is misplaced, because it is uncertain, in light of the ambiguity discussed above, whether a proper construction is one of the proposed constructions. Also, Petitioner does not explain why we should find that what have been proposed would fill the entire universe of possible constructions to consider. Thus, that the grounds allegedly satisfy all proposed constructions does not resolve the ambiguity problem.

Finally, Petitioner contends that the limitation “the control station [, in addition to functions in accordance with the second radio interface standard] also carries out functions which cause radio systems in accordance with the second radio interface standard to interpret the radio channel as interfered and to seize another radio channel for its own operation” constitutes a means-plus-function element. Pet. 15. Petitioner also asserts that the alleged grounds of unpatentability rely on prior art references that disclose “*the only possible [corresponding] structure in the specification*” with respect to the means-plus-function element. *Id.* The argument is without merit because (1) we disagree that the limitation constitutes a means-plus-function element under 35 U.S.C. § 112, paragraph 6,¹¹ and (2) as discussed above, the Specification does not indicate interchangeable use of the terms “radio system” and “stations” but, rather, describes stations as contained within a radio system. It is not enough for Petitioner to rely on mere “possible” correspondence of disclosed structure, which has not been sufficiently established.

¹¹ Paragraphs 1–6 of § 112 were replaced with §§ 112(a)–(f) when § 4(c) of the Leahy-Smith America Invents Act, Pub. L. No. 112–29, 125 Stat. 284, 329 (2011) (“AIA”) took effect on September 16, 2012. Because the patent application resulting in the ’676 patent was filed before the effective date of the AIA, we refer to the pre-AIA version of 35 U.S.C. § 112.

Under 35 U.S.C. § 112, paragraph 6, “[a]n element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.” The limitation at issue here, i.e., “the control station [, in addition to functions in accordance with the second radio interface standard] also carries out functions which cause radio systems in accordance with the second radio interface standard to interpret the radio channel as interfered and to seize another radio channel for its own operation” does not include the word “means” and thus presumptively is not a means-plus-function limitation under 35 U.S.C. § 112, paragraph 6. *See Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015) (en banc). However, that presumption can be overcome when the phrase does not recite sufficiently definite structure or recites function without sufficient structure for performing that function. *Id.* at 1349.

Petitioner has not alleged, much less submitted evidence to demonstrate, that one with ordinary skill in the art would not have recognized the term “control station” as setting forth at least a class of specific structures. Dr. Roy, Petitioner’s technical witness, gave no testimony to that effect. Furthermore, if “control station” is entirely functional in the claim, it is just as functional in the Specification and cannot constitute the corresponding structure. Additionally, whether “control station” is functional or structural does not resolve the ambiguity discussed above, which relates to the term “radio systems” in the limitation.

Patent Owner argues that the limitation of claim 8 at issue is not ambiguous but clear. PO Resp. 36–37. Patent Owner asserts:

[T]he Patent Owner respectfully submits that the scope of Claim 8 is not ambiguous. Contrary to the statement in the Board decision, Paper No. 9, 50-51, the control station may carry out functions which would cause *radio systems*, i.e., *any radio system capable of receiving a signal from the control station*, which radio system operates in accordance with the second radio interface standard, to understand that the radio channel/at least one common frequency band, is not available; as a result, any such radio systems would use a different radio channel. Thus, the “radio systems” are clearly *other* radio systems, other than the radio system recited in the preamble to which the stations and the control station belong. It is also clear that by the radio channel/at least one common frequency being interfered it is clear that there are transmissions in the radio channel/at least one common frequency, such that the other radio systems would experience interference if they transmitted in that radio channel/at least one common frequency.

Moreover, the alleged uncertainty as to the recitation “for its own operation” is not of concern. It is clear that the phrase refers to *any one* of the other radio systems, as it is clear that “for its own operation” refers to the action “to seize another radio channel,” and there is no question that it is the [other] radio systems which, based on the functions of the control station, seize another radio channel.

As it is clear that the “radio systems” are other radio systems, and not the radio system of the preamble, the meaning of that term is clear. In addition, as the meaning of the phrase “interpret the radio channel as interfered” makes clear that the radio systems understand that, if the radio systems were to transmit in the radio channel, the signals of the radio systems would be interfered with, and as the reference of “for its own operation” to any one of the other radio systems is clear, the meaning of claim 8 is not ambiguous.

PO Resp. 36–37.

The arguments are unpersuasive. For each point addressed by Patent Owner, rather than to explain with reasons, references to embodiments in the Specification, and supporting testimony from a technical witness, Patent

Owner simply concludes that it is clear the language at issue carries a certain meaning. Such conclusory disagreement, without analysis and factual underpinning, is not sufficient to persuade. Petitioner correctly notes that Patent Owner's arguments are merely "raw attorney argument, citing no evidence or expert testimony." Reply 30. Argument of counsel cannot take the place of evidence lacking in the record. *Meitzner v. Mindick*, 549 F.2d 775, 782 (CCPA 1977).

Further, Patent Owner's proposed construction is anything but a clear reading of the claim as Patent Owner asserts. Despite the fact that claim 8 begins with recitation of a "radio system," Patent Owner urges that "radio systems" in the body of the claim clearly refers to radio systems *other than* the radio system previously introduced in the claim. PO Resp. 36–37. That proposed reading runs against the grain is not readily suggested by the claim language and the previous introduction of "radio system." Patent Owner does not explain why one with ordinary skill would not attempt a reading that maps to a previous introduction of the same term. Also, Patent Owner's proposed construction limits actions of radio systems that are outside of the operation of the radio system that is claimed. Such a reading is atypical and certainly less than clear.

Regarding situations where the Board cannot reasonably determine the scope of a challenged claim, the Court of Appeals for the Federal Circuit has instructed as follows:

[T]he proper course for the Board to follow, if it cannot ascertain the scope of a claim with reasonable certainty for purposes of assessing patentability, is to decline to institute the IPR or, if the indefiniteness issue affects only certain claims, to conclude that it could not reach a decision on the merits with respect to whether petitioner had established the unpatentability of those claims under sections 102 or 103.

Samsung Elecs. Am., Inc. v. Prisia Eng'g Corp., 948 F.3d 1342, 1353 (Fed. Cir. 2020) (footnote omitted). This is such a situation. We cannot reach a decision on the merits with respect to whether Petitioner has established the unpatentability of claim 8 under any ground of unpatentability asserted by Petitioner, i.e., (1) obvious over Sherman and Trompower, (2) obvious over Shellhammer and Trompower, and (3) obvious over Shellhammer and Panasik.

III. CONSTITUTIONAL APPOINTMENT

Patent Owner argues that Administrative Patent Judges (“APJs”) “are principal officers under the Appointments Clause of the Constitution” “but undisputably are not appointed through the constitutionally-mandated mechanism of appointment for principal officers.” PO Resp. 60. The Federal Circuit, however, addressed this issue and devised a remedy in *Arthrex, Inc. v. Smith & Nephew, Inc.*, 941 F.3d 1320, 1325 (Fed. Cir. 2019) *cert. granted sub nom. United States v. Arthrex, Inc.*, 2020 WL 6037206 (Oct. 13, 2020). Patent Owner argues that the remedy devised by the Federal Circuit “impermissibly rewrites the statutes governing APJs.” *Id.* at 61. We decline to consider the argument because the *Arthrex* decision states otherwise. *See Arthrex*, 941 F.3d at 1337 (“This as-applied severance . . . cures the constitutional violation.”).

IV. CONCLUSION¹²

Petitioner has proved by a preponderance of the evidence that claims 3 and 9 of the '676 patent are unpatentable on at least one asserted ground of unpatentability, as summarized in the following table:

¹² Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this

| Claims | 35 U.S.C. § | Reference(s)/ Basis | Claim Shown Unpatentable | Claim Not Shown Unpatentable |
|----------------------------|------------------------|--------------------------------|-------------------------------------|---|
| 3, 6, 9 | 103(a) | Sherman | | 3, 6, 9 |
| 3, 7, 9 | 103(a) | Shellhammer | 3, 9 | 7 |
| Overall Outcome | | | 3, 9 | 6, 7 |

We cannot reach a decision on the merits with respect to whether Petitioner has established the unpatentability of claim 8 under any ground of unpatentability asserted by Petitioner. *See Samsung*, 948 F.3d at 1353.

V. ORDER

Accordingly, it is:

ORDERED that claims 3 and 9 of the '676 patent have been proved unpatentable; and

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

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

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For PETITIONER:

Harper Batts
Jeffrey Liang
Chris Ponder
Sheppard, Mullin, Richter & Hampton LLP
hbatts@sheppardmullin.com
jliang@sheppardmullin.com
cponder@sheppardmullin.com

For PATENT OWNER:

Ryan Loveless
Brett Mangrum
James Etheridge
Jeffrey Huang
Etheridge Law Group
ryan@etheridgelaw.com
brett@etheridgelaw.com
jim@etheridgelaw.com
jeff@etheridgelaw.com