

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEL CORPORATION,
Petitioner,

v.

AX WIRELESS, LLC,
Patent Owner.

IPR2023-01143
Patent 9,584,262 B2

Before KRISTEN L. DROESCH, TERRENCE W. McMILLIN, and
MICHAEL T. CYGAN, *Administrative Patent Judges*.

DROESCH, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

A. Background

Intel Corporation (“Petitioner”)¹ filed a Petition requesting *inter partes* review (“IPR”) of claims 1–6, 8–14, 16–19, 21–30, and 32 of U.S. Patent No. 9,584,262 B2 (Ex. 1001, “the ’262 Patent”). Paper 2 (“Pet.”). Petitioner filed a Declaration of Thomas F. LaPorta, Ph.D., in support of its Petition. Ex. 1003. AX Wireless, LLC (“Patent Owner”)² timely filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). Patent Owner filed a Declaration of Zygmunt Haas, Ph.D., in support of its Preliminary Response. Ex. 2001. Pursuant to our authorization (Paper 7), Petitioner filed a reply (Paper 8, “Prelim. Reply”) and Patent Owner filed a sur-reply (Paper 9, “Prelim. Sur-reply”) to address the discretionary-denial factors articulated in *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential) (“*Fintiv*”) and *Sotera (Sotera Wireless, Inc. v. Masimo Corporation*, IPR202-01019, Paper 12, 13–14 (PTAB Dec. 1, 2020) (precedential as to §II.A.)) stipulations offered by real parties-in-interest Dell and Lenovo.

We have authority to determine whether to institute review under 35 U.S.C. § 314 and 37 C.F.R. § 42.4(a). An *inter partes* review may not be instituted unless it is determined that “the information presented in the petition filed under section 311 and any response filed under section 313 shows that there is a reasonable likelihood that the petitioner would prevail

¹ Petitioner identifies itself, Dell Inc., Dell Technologies Inc. (collectively “Dell”), and Lenovo Group Ltd. (“Lenovo”) as the real parties-in-interest to this proceeding. Pet. 89.

² Patent Owner identifies itself “and its corporate parent, IdeaHub, Inc.” as the real parties-in-interest to this proceeding. Paper 4, 1.

with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a).

For the reasons provided below, after considering the Petition, Preliminary Response, Preliminary Reply, and Preliminary Sur-reply, we decline to exercise discretion to deny institution and determine, based on the record before us, there is a reasonable likelihood Petitioner would prevail in showing at least one of the challenged claims is unpatentable.

B. Related Matters

The parties identify *AX Wireless LLC, v. Dell Inc., and Dell Technologies Inc.*, 2-22-cv-00277 (E.D. Tex.) (“Dell proceeding”); *AX Wireless LLC, v. Lenovo Group Ltd.*, 2-22-cv-00280 (E.D. Tex.) (“Lenovo proceeding”); *AX Wireless LLC, v. HP Inc.*, 2-22-cv-00279 (E.D. Tex.) (“HP proceeding”); and *AX Wireless LLC, v. Acer Inc.* 2-23-cv-00041 (E.D. Tex.) (“Acer proceeding”) as currently pending related district court proceedings involving the ’262 Patent. Pet. 89–90; Paper 4, 1.

Patent Owner asserts that Petitioner filed petitions for *inter partes* review challenging the following patents asserted in the district court proceedings: U.S. Patent Nos. 10,917,272, 9,614,566, 9,973,361, 10,079,707, 10,291,449, 10,554,459, and 11,212,146. Paper 4, 1.

C. The ’262 Patent (Ex. 1001)

The ’262 Patent relates to “exemplary methods, systems, means, protocols and computer-readable storage media, . . . directed toward header repetition in a communications environment.” Ex. 1001, 1:21–24. By way of background, the ’262 Patent discloses that “[c]onventional multi-user communications system use frame-based (or packet-based) transmission to communicat[e] between two or more users over a shared channel based on

Orthogonal Frequency Division Multiplexing (OFDM),” such as “IEEE 802.11 (Wireless LAN), IEEE 802.16 (WiMAX), and ITU G.9960 (G.hn).” *Id.* at 1:28–33, 1:35–37.

“A packet is usually formed by a preamble, header, and payload” *Id.* at 1:33–34. The ’262 Patent, discloses that it is “essential to decode the header reliably” since “[t]he header contains important control information for the receiver to decode the payload properly, and also provides information about the packet length for virtual carrier sensing.” *Id.* at 1:43–46. In this regard, the ’262 patent notes that in G.9960, “the header containing PHY_H bits (header information block) is carried over one or two OFDM symbols (D=1 or 2), and within each symbol, multiple header information blocks are repeated over the entire frequency band.” *Id.* at 1:46–55 (citing Editor for G.9960, “ITU-T Recommendation G.9960: Next generation wire-line based home networking transceivers—Foundation,” ITU-T SG15/Q4, January 2009).

The ’262 Patent discloses a technique “allowing different values of D in a single domain where nodes are operating in different portions of frequency bands.” *Id.* at 2:6–8. “If D is fixed to 2, then it increases reliability for the narrowband devices, but may also unnecessarily increase overhead for the wide-band devices.” *Id.* at 2:16–19. Hence, the ’262 Patent is “directed to techniques to accommodate different repetitions schemes (D=1, . . . , D_{MAX} and H=1, . . . , H_{MAX}) in a single domain, and still allow devices to communicate with one another,” where “D_{MAX} and H_{MAX} can be 2 or larger than 2.” *Id.* at 2:21–25.

Figure 1 of the '262 Patent is reproduced below.

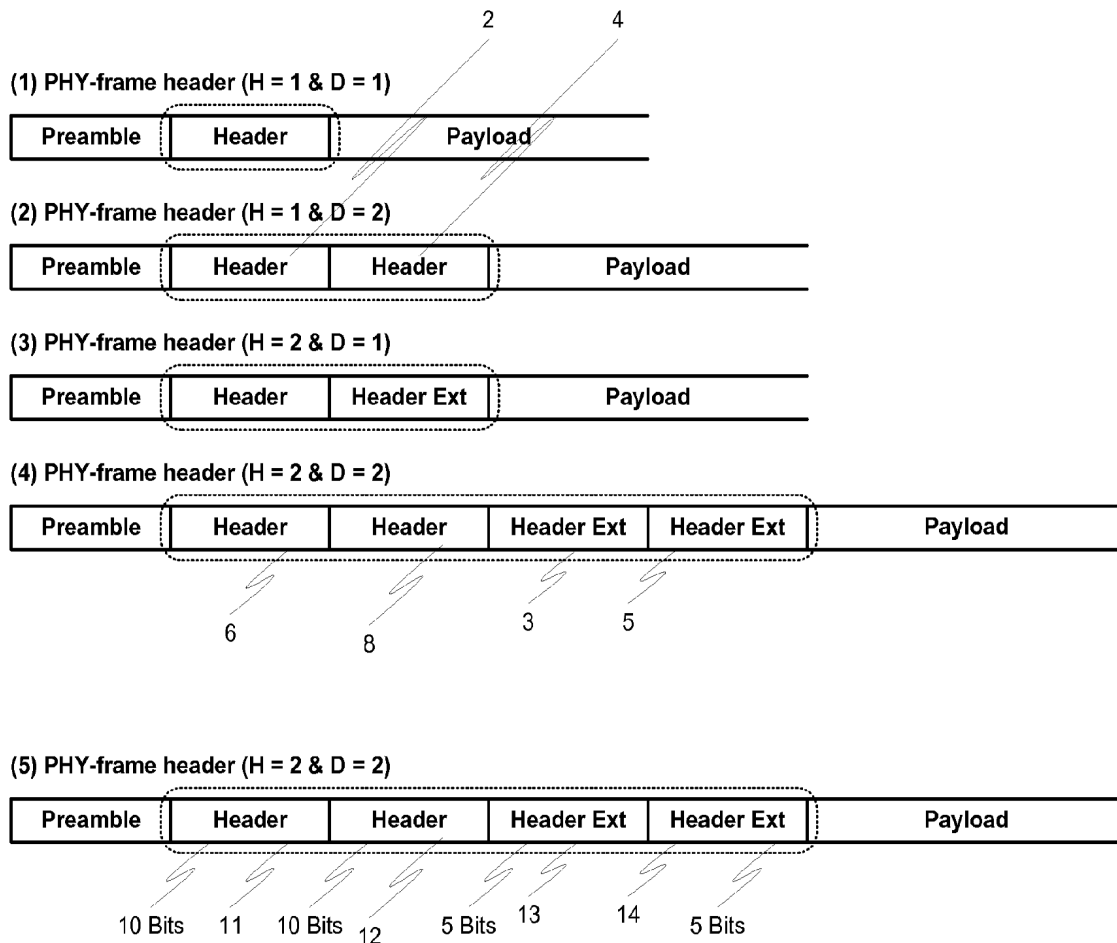


Figure 1 depicts “various header repetition schemes . . . where D, H=1 or 2.”

Id. at 2:26–27. Specifically:

in the first example, H=1 and D=1 with a preamble followed by a header followed by a payload. In a second example H=1 and D=2, with the preamble followed by header 2 that is repeated as header 4, which is followed by the payload. As discussed, the repeated header can be repeated in full or in part. In the third example, H=2 and D=1, such that the preamble is followed by a header which is followed by an extended header and the payload. In the fourth example, H=2 and D=2 such that header 6 is repeated as header 8, and the extended header 3 is repeated as extended header 5, which is followed by the payload. As discussed, the repeated portions may be exact duplicates.

Id. at 5:45–57. The ’262 Patent discloses “the label ‘Header Ext’ emphasizes the fact that it may contain different header information than the ‘Header.’” *Id.* at 2:30–32; *see also id.* at 5:59–6:7.

D. Illustrative Challenged Claim

Claims 1, 9, 17, and 25 are independent, and claims 2–6, 8, 10–14, 16, 18, 19, 21–24, 26–30, and 32 depend directly or indirectly therefrom, respectively. *See* Ex. 1001, 12:40–13:12, 13:15–58, 13:61–14:26, 14:29–15:14, and 15:17–18. Claim 1 is reproduced below:

1. A wireless OFDM (Orthogonal Frequency Division Multiplexing) transceiver operable to:
 - receive, in a first narrower frequency band, by a receiver using wireless OFDM communications, a first packet comprising a first number of OFDM symbols that carry a first plurality of header bits;
 - demodulate, by a demodulator connected to and in communication with the receiver, the first number of OFDM symbols to determine the first plurality of header bits, wherein at least one header bit of the first plurality of header bits in the first packet is repeated on a plurality of OFDM subcarriers;
 - receive, in a second wider frequency band, by the receiver using wireless OFDM communications, a second packet comprising a second number of OFDM symbols, less than the first number of OFDM symbols, that carry a second plurality of header bits, different than the first plurality of header bits; and
 - demodulate, by the demodulator, the second number of OFDM symbols to determine the second plurality of header bits, wherein the first narrower and second wider frequency bands have one or more overlapping frequency regions.

Id. at 12:40–62.

E. Asserted Patentability Challenges and Asserted Prior Art

Petitioner asserts that claims 1–6, 8–14, 16–19, 21–30, and 32 are unpatentable on the following grounds (Pet. 4):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–6, 8–14, 16–19, 21–30, 32	103(a) ³	Hansen, ⁴ WWiSE ⁵
1–6, ⁶ 8–14, 16–19, 21–30, 32	103(a)	Zhang, ⁷ Maltsev ⁸

II. DISCRETION TO INSTITUTE INTER PARTES REVIEW

Patent Owner contends the Board should exercise its discretion to deny institution under 35 U.S.C. § 314, citing the discretionary-denial factors articulated in *Fintiv*. See Prelim. Resp. 56–62. More specifically, Patent Owner contends that all of the *Fintiv* factors weigh in favor of discretionary denial in view of the two parallel district court proceedings involving Petitioner’s real parties-in-interest Dell and Lenovo. See *id.* at 57–62.

Under § 314(a), the Director has discretion to deny institution of an *inter partes* review, and that discretion has been delegated to the Board.

³ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011), amended 35 U.S.C. § 103 effective March 16, 2013. Because the ’262 Patent claims an effective filing date prior to March 16, 2013, we refer to the pre-AIA version of § 103.

⁴ US 2006/0182017 A1, published Aug. 17, 2006 (Ex. 1006, “Hansen”).

⁵ Kose et al., *WWiSE Proposal: High throughput extension to the 802.11 Standard*, IEEE P802.11 Wireless LANs (dated Mar. 18, 2005) (Ex. 1005, “WWiSE”).

⁶ Although Petitioner’s listing of the claims challenged on the basis of Zhang and Maltsev does not include claims 5 and 6, the Petition substantively addresses the asserted unpatentability of claims 5 and 6 based on Zhang and Maltsev. Compare Pet. 4, 46, with Pet. 86–87.

⁷ US 2010/0260159 A1, published Oct. 14, 2010 (Ex. 1017, “Zhang”).

⁸ US Patent 7,349,436 B2, issued Mar. 25, 2008 (Ex. 1018, “Maltsev”).

See 37 C.F.R. § 42.4(a) (“The Board institutes the trial on behalf of the Director.”); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2140 (2016) (“[T]he agency’s decision to deny a petition is a matter committed to the Patent Office’s discretion.”); *SAS Inst. v. Iancu*, 138 S. Ct. 1348, 1356 (2018) (“[Section] 314(a) invests the Director with discretion on the question whether to institute review” (emphasis omitted)); *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1367 (Fed. Cir. 2016) (“[T]he PTO is permitted, but never compelled, to institute an IPR proceeding.”).

The Board may, in the interest of fairness and the efficient use of Board resources, deny institution under § 314(a) where there are parallel district-court proceedings involving the same or substantially the same parties and invalidity challenges. *Fintiv*, Paper 11 at 5–6, 12–13 (setting out six nonexclusive factors that the Board may consider in determining whether to deny institution because of a parallel district-court proceeding). “These factors relate to whether efficiency, fairness, and the merits support the exercise of authority to deny institution in view of an earlier trial date in the parallel proceeding.” *Id.* at 6.

Our analysis under *Fintiv* is guided by the USPTO Director’s Memorandum titled *Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation* (June 21, 2022)⁹ (“*Fintiv* Memo”). The *Fintiv* Memo sets forth, *inter alia*, that the Board will not discretionarily deny institution under § 314(a) when a petitioner submits a so-called *Sotera* stipulation, i.e., the petitioner

⁹ Available at https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf

“stipulates not to pursue in a parallel district court proceeding the same grounds as in the petition or any grounds that could have reasonably been raised in the petition.” *Fintiv* Memo 7 (citing *Sotera*). A *Sotera* stipulation mitigates concerns of potentially conflicting PTAB and district-court decisions and duplicative efforts between the district court and PTAB. *Id.*

In the Preliminary Reply, Petitioner notes that it is not a party to any proceeding brought by Patent Owner, but named Dell and Lenovo as real parties-in-interest. *See* Prelim. Reply 1. Petitioner filed stipulations from its real parties-in-interest Dell and Lenovo, in which each of Dell and Lenovo state that they “will not pursue in this litigation the grounds raised or any other grounds that could have reasonably been raised before the PTAB in that instituted proceeding.” Exs. 1038, 1039. Petitioner further notes that Patent Owner brought four separate district court proceedings asserting the ’262 Patent against Dell, Lenovo, as well as against HP Inc. (“HP”) and Acer Inc. (“Acer”). *See* Prelim. Reply 1. According to Petitioner, “[t]he *Sotera* stipulations from Dell and Lenovo remove any overlap between the present IPR and the Dell and Lenovo litigations.” *Id.* Petitioner asserts, “[g]iven the *Sotera* stipulations and the *Fintiv* Memo guidance, the Board should decline to exercise its discretion to deny institution.” *Id.* at 1–2.

In light of the mandatory *Fintiv* guidance regarding *Sotera* stipulations discussed above, we decline to exercise discretion under § 314(a) to deny institution of *inter partes* review. The *Sotera* stipulations filed by Petitioner’s real parties-in-interest Dell and Lenovo mitigate the concerns of potentially conflicting PTAB and district-court decisions as to the disputes between Petitioner, Dell, and Lenovo, and Patent Owner.

In the Sur-reply, Patent Owner asserts that, despite Dell's and Lenovo's stipulations, the Petition still includes the same grounds that will be presented in the district court because real party-in-interest Dell and HP submitted joint invalidity contentions with the same grounds as those presented in this Petition. *See* Prelim. Sur-reply 1. Patent Owner points out that Petitioner "does not contend that HP . . . is bound in any way by Dell's stipulation." *Id.* Patent Owner asserts that the Director's *Fintiv* memorandum does not directly address this situation, but "is instead directed to the situation where the petitioner (rather than a collection of RPIs and privies) is the defendant in one parallel [district] court proceeding (rather than multiple related proceedings), and the petitioner (rather than its RPIs and privies) submits a stipulation." *Id.* (citing *Fintiv* Memo 7). Patent Owner suggests that HP is a real party-in-interest or privy on the basis that Petitioner "supplies HP, just as it supplies Dell and Lenovo." *Id.* (citing Ex. 2036, 5). Moreover, Patent Owner points out that Acer has submitted invalidity contentions that include the same grounds as the Petition. *See* Prelim. Sur-reply 1. Patent Owner suggests Acer is also a real party-in-interest or privy on the basis that Petitioner "also supplies Acer." *Id.*; *see id.* at 2 (citing Ex. 2023; Ex. 2034, 3).

Patent Owner asserts that Petitioner bears the burden of showing that institution is warranted but never explains why the HP district court proceedings or Acer's district court proceedings "do not raise the same 'concerns of inefficiency and the possibility of conflicting decision' as the Dell and Lenovo" district court proceedings. Prelim. Sur-reply 2 (quoting *Fintiv* Memo 12, citing *Fintiv* Memo 12). According to Patent Owner, Petitioner "insinuates that HP (and Acer) are *not* privies or RPIs in a cryptic

footnote citing the original *Fintiv* decision (Reply 1 n.1), but carefully avoids stating so in a transparent attempt to avoid its routine discovery obligations.” *Id.*

As an initial matter, for the first time in the Sur-reply Patent Owner contends that we should exercise discretion to deny institution on the basis of the HP district court proceeding and the Acer district court proceeding. Patent Owner did not previously address discretionary denial on the basis of these district court proceedings, but instead addressed “the two parallel district court proceedings involving . . . Dell and Lenovo.” Prelim. Resp. 56; *see id.* at 56–57. Patent Owner’s arguments are belated and outside the proper scope of a proper sur-reply, and should not be considered.

“Generally, a reply or sur-reply may only respond to arguments raised in the preceding brief.” Patent Trial and Appeal Board Consolidated Trial Practice Guide (Nov. 2019) (“CTPG”) ¹⁰ 74 (citing 37 C.F.R. § 42.23). It “does not mean to proceed in a new direction with a new approach as compared to the positions taken in a prior filing.” *Id.*

In any event, even if we were to consider Patent Owner’s belated arguments, Patent Owner does not direct us to evidence to support its argument that HP and Acer are real parties-in-interest or privies. Nor does Patent Owner direct us to evidence demonstrating any involvement or control by HP or Acer in this proceeding. Thus, HP and/or Acer’s actions, including whether they raise these same grounds of unpatentability in their respective district court proceedings, should not be imputed to Petitioner.

¹⁰ Available at <https://www.uspto.gov/sites/default/files/documents/tpgnov.pdf?MURL=TrialPracticeGuideConsolidated>

In sum, because Petitioner filed *Sotera* stipulations by Dell and Lenovo, we decline to exercise discretion to deny institution under § 314(a).

III. ANALYSIS

A. Principles of Law

A claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) if in evidence, so-called secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).¹¹

B. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art “at the time of the purported invention would have had at least a master’s degree in electrical engineering or similar discipline, and/or two to three years of experience working or conducting research in wireless communication protocols, or an equivalent combination of education and experience.” Pet. 8 (citing Ex. 1003 ¶ 70). Patent Owner asserts that “[f]or purposes of this Preliminary Response, Patent Owner does not contest the level of ordinary skill proposed by [Petitioner], but reserves the right to do so.” Prelim. Resp. 2 (citing Pet. 8).

¹¹ At this stage of the proceeding, the parties do not present evidence or arguments regarding secondary considerations.

For the purpose of determining whether to institute trial, we adopt Petitioner’s definition of a person of ordinary skill in the art because it is consistent with the level of skill reflected by the ’262 Patent Specification and the asserted prior art.

C. Claim Construction

In an *inter partes* review proceeding, the Board applies the same claim construction standard as that applied in federal courts in a civil action under 35 U.S.C. § 282(b), which is generally referred to as the *Phillips* standard. *See* 37 C.F.R. § 42.100(b); *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). Under the *Phillips* standard, “words of a claim ‘are generally given their ordinary and customary meaning.’” *Phillips*, 415 F.3d at 1312.

“Petitioner does not believe it is necessary for the Board to expressly construe any term for the purpose of this IPR proceeding.” Pet. 8 (citing *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). Patent Owner does not propose any terms for express construction in the preliminary response. *See generally* Prelim. Resp.

As demonstrated in the analysis below, at this stage of the proceeding, we need not construe any claim terms and phrases to resolve the controversy before us. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. Patentability Challenge Based on Hansen and WWiSE

Petitioner asserts that the subject matter of claims 1–6, 8–14, 16–19, 21–30, and 32 are unpatentable as obvious under 35 U.S.C. § 103 based on Hansen and WWiSE. Pet. 9–45. Patent Owner disagrees. Prelim. Resp. 3–47. Patent Owner argues that WWiSE is not a prior art printed publication. *Id.* at 3–11. Patent Owner presents its additional non-obviousness arguments in the context of arguing against Petitioner’s contentions with regard to motivation to combine Hansen and WWiSE in the manner set forth in the Petition. *See* Prelim. Resp. 22–46.

We begin our analysis by providing a summary of the asserted references and then consider the contentions of the parties.

1. Overview of Hansen (Ex. 1006)

Hansen “relate[s] to a method and system for compromise greenfield preambles for 802.11n.” Ex. 1006 ¶ 7. By way of background, Hansen notes that “IEEE 802.11 task group N (TGn) has been chartered to develop a standard to enable WLAN devices to achieve throughput rates beyond 100 Mbits/s,” which “may be documented in IEEE resolution 802.11n.” *Id.* ¶ 8. In comparison, “current existing 802.11 standards, such as 802.11(a),(b),(g), . . . may support up to 54 Mbps data rates, either in 2.4 GHz or in 5 GHz frequency bands.” *Id.* ¶ 9. “The IEEE resolution 802.11n may enable WLAN devices compatible with IEEE 802.11[n] to also interoperate with IEEE 802.11 devices that are not compatible with IEEE 802.11n.” *Id.* ¶ 32. “WLAN devices that are compatible with IEEE 802.11 but are not compatible with IEEE 802.11 n may be referred to as legacy IEEE 802.11 WLAN devices.” *Id.*

Hansen describes “greenfield access mode” and “mixed mode access” for WLAN devices that are compatible with IEEE 802.11n as follows:

WLAN devices that are compatible with IEEE 802.11n and communicate with other IEEE 802.11n compatible WLAN devices in an IEEE basic service set (BSS) of which no legacy IEEE 802.11 WLAN devices are currently members may be capable of communicating in a greenfield access mode. When utilizing greenfield access, communications between the WLAN devices may utilize capabilities specified in IEEE 802.11n that may not be accessible to legacy WLAN devices. WLAN devices that are compatible with IEEE 802.11n, and that communicate with IEEE 802.11n compatible WLAN devices in an IEEE BSS, of which legacy IEEE 802.11 WLAN devices are currently members, may utilize mixed mode access.

Id. ¶ 32.

“A plurality of proposals is emerging as candidates for incorporation in IEEE resolution 802.11n,” including “proposals from, the worldwide spectrum efficiency (WWiSE) group, and TGn Sync.” *Id.* ¶¶ 9, 33. “The WWiSE proposals may comprise a plurality of enhancements to legacy IEEE 802.11 WLAN devices for incorporation in IEEE 802.11n WLAN devices.” *Id.* ¶ 34. According to Hansen, since “[c]urrent proposals from TGn Sync may not provide a mechanism to support greenfield access,” “mixed mode access communications based on current TGn Sync may be required to comprise information that may not be required in greenfield access communications.” *Id.* ¶ 33.

Hansen discloses “[v]arious embodiments of the invention [that] may enable a greenfield access mode in IEEE 802.11n WLAN systems compared to an alternative approach that may not provide methods for greenfield access.” *Id.* ¶ 27; *see also id.* ¶¶ 21 (“FIG. 5a shows exemplary training fields and header fields for greenfield access in accordance with a WWiSE

proposal for $N_{ss}=2$, in accordance with an embodiment of the invention.”), 24 (“FIG. 6a shows exemplary training fields and header fields with trailing signal field for greenfield access for $N_{ss}>2$, in accordance with an embodiment of the invention.”), 77, 87, Figure 5a, Figure 6a. According to Hansen:

The utilization of green field access may reduce the portion of time required to transmit data due to overhead comprising preamble fields and header fields. This may enable higher data throughput rates to be achieved. This may further enable more robust transmission of data by enabling comparable data rates to be maintained while reducing the coding rate of encoded transmitted data. The reduction of the coding rate may enable comparable data rates to be maintained for transmission via RF channels characterized by lower SNR while still achieving desired target levels of packet error rates.

Id. ¶ 27.

Hansen also discloses that “mixed mode access may be achieved while reducing a portion of time required for transmitting data due to overhead comprising preamble fields and header fields.” *Id.* ¶ 28; *see also id.* ¶¶ 18 (“FIG. 4a shows exemplary training fields and header fields for mixed mode access in accordance with a TGn Sync proposal that may be utilized in connection with an embodiment of the invention.”), 26 (“FIG. 7 shows exemplary training fields and header fields for mixed mode access for $N_{ss}>2$, in accordance with an embodiment of the invention.”), 61, 111, Figure 4a, Figure 7.

Figure 2b is reproduced below and illustrates “an exemplary block diagram of a transceiver comprising a transmitter and a receiver in a MIMO

[(multiple input multiple output)] system, which may be utilized in accordance with an embodiment of the invention.” *Id.* ¶ 15; *see also id.* ¶ 41.

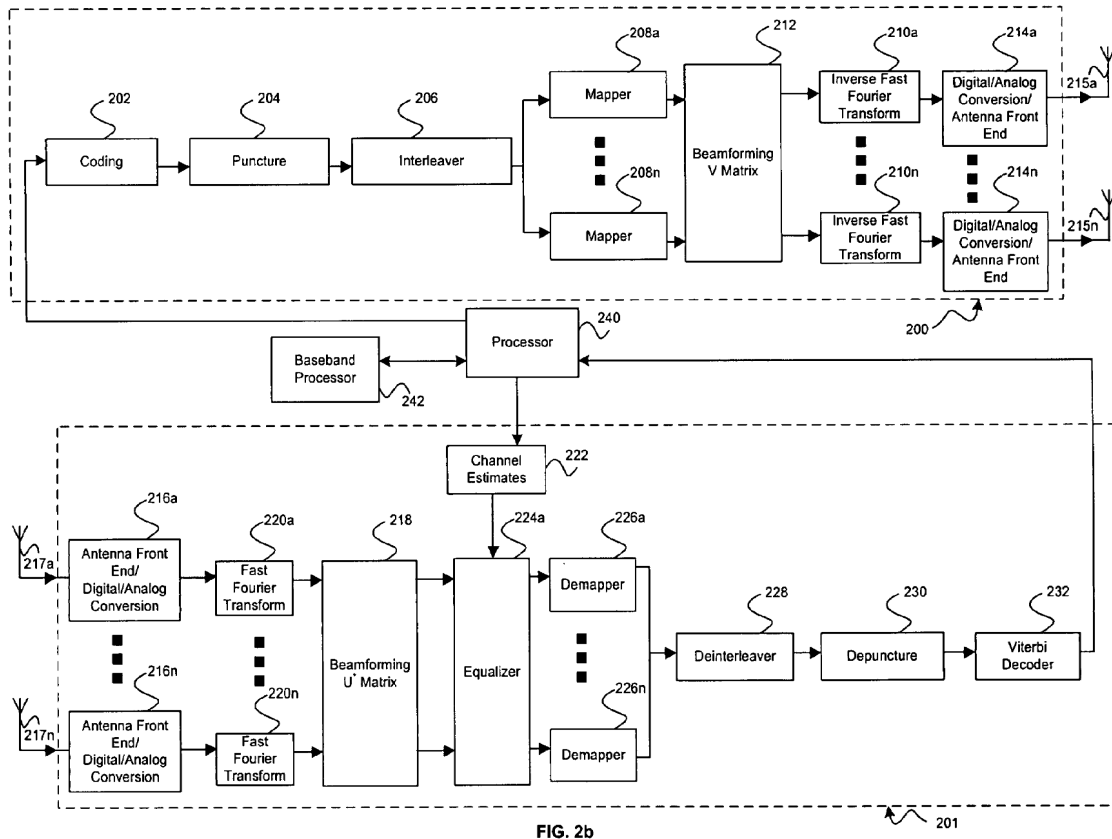


Figure 2b shows “a transmitter 200 a receiver 201, a processor 240, a baseband processor 242, a plurality of transmitter antennas 215a, . . . , 215n, and a plurality of receiver antennas 217a, . . . , 217n.” *Id.* ¶ 41.

2. Overview of WWiSE (Ex. 1005)

WWiSE is a document entitled “WWiSE Proposal: High throughput extension to the 802.11 Standard,” and includes “[c]hanges and additions to IEEE Std. 802.11-1999 (Reaff 2003), as amended by published amendments IEEE802.11a, IEEE802.11g, IEEE802.11h and IEEE802.11i and by IEEE draft standard 802.11e/D9.0 [that] are provided to support a new high

throughput physical layer (PHY) for operation in the 2.4 and 5 GHz bands.”
Ex. 1005, 1.

WWiSE “specifies the PHY entity for a multiple input multiple output orthogonal frequency division multiplexing (MIMO-OFDM) system and the additions that have to be made to the base standard to accommodate the MIMO-OFDM PHY.” *Id.* at 55:6–8. WWiSE defines the protocol functions for the MIMO-OFDM PHY layer as follows:

- a) A PHY convergence function, which adapts the capabilities of the physical medium dependent (PMD) system to the PHY service. This function is supported by the physical layer convergence procedure (PLCP), which defines a method of mapping the IEEE 802.11 PHY sublayer service data units (PSDU) into a framing format suitable for sending and receiving user data and management information between two or more stations using the associated PMD system.
- b) A PMD system whose function defines the characteristics and method of transmitting and receiving data through a wireless medium between two or more stations, each using the MIMO-OFDM PHY.

Id. at 55:39–46. WWiSE “provides a convergence procedure by which PSDUs are converted to and from PPDU at the transmitter and receiver.”

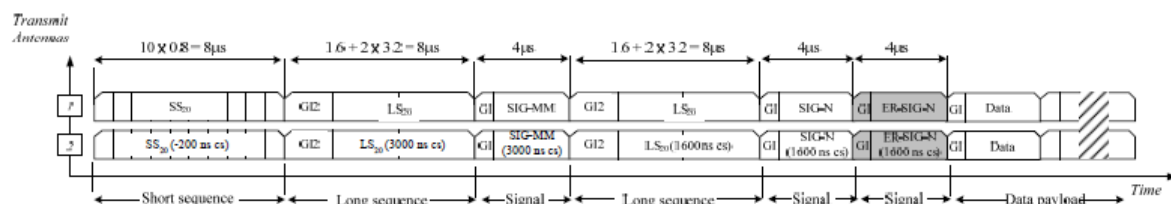
Id. at 58:5–6. “During transmission, the PSDU shall be appended with a PLCP preamble and header to create the PPDU. At the receiver, the PLCP preamble and header are processed to aid in the demodulation and delivery of the PSDU.” *Id.* at 58:6–8.

According to WWiSE, “Extended Range (ER) capable devices are devices which support the optional Extended Range MCS [(modulation and coding scheme)], in addition to the Normal Range (NR) MCS, and the long SIG-N field format” *Id.* at 50:9–10; *see id.* at 15:12

Due to the optional nature of the ER MCS, and considering the problem of backwards compatibility with pre-802.11n devices, the AP [(access point)] may decide to transmit a beacon using an NR MCS. This beacon will be referred to as an NR beacon. However, for ER stations to benefit from the larger BSA, the ER capable AP may also transmit a second beacon, using an ER MCS, which is referred to as an ER beacon. ER beacons allow ER devices to find the AP and associate with it even when they are outside of the NR range.

Id. at 50:15–20.

WWiSE specifies that “[t]he SIGNAL-N field (SIG-N) is separately defined for a mandatory standard configuration and an optional ‘extended communication range’ configuration (ER)” *Id.* at 69:10–11. “In the mandatory standard configuration, SIG-N is composed of a single MIMO-OFDM symbol that provides all length and configuration parameters associated with a MIMO-OFDM PPDU.” *Id.* at 69:13–14. “In the extended communication range configuration (ER), SIG-N is composed of two consecutive MIMO-OFDM symbols: The SIG-N MIMO-OFDM symbol is followed by a second MIMO-OFDM symbol, denoted as ER-SIG-N.” *Id.* at 69:16–18. For example, Figure 008 is reproduced below, illustrating “MIMO-OFDM Training structure for $N_{TX}=2$, 20 MHz, mixed-mode operation,” wherein “[t]he shaded field indicates the optional duplicate SIG-N for extended range communication.” *Id.* at 67:6–7, Fig. 8.



3. Prior Art Status of WWiSE

Petitioner asserts that WWiSE is “prior art under 35 U.S.C. pre-AIA §102(b) because the document was available and accessible to the public on July 9, 2005.” Pet. 1 (citing Ex. 1007 ¶ 24). In response, Patent Owner contends that Petitioner “failed to demonstrate public accessibility of . . . WWiSE—and thus all of its proposed grounds fail.” Prelim. Resp. 11; *see id.* at 3–11.

It has long been recognized that the touchstone as to whether an asserted reference qualifies as prior art is public accessibility. *See In re Hall*, 781 F.2d 897, 899 (Fed. Cir. 1986). “[A]t the institution stage, the petition must identify, with particularity, evidence sufficient to establish a reasonable likelihood that the reference was publicly accessible before the critical date of the challenged patent and therefore that there is a reasonable likelihood that it qualifies as a printed publication.” *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29, 13 (PTAB Dec. 20, 2019) (precedential).

Petitioner relies on the Declaration of James L. Lansford, Ph.D. (Ex. 1007) to support its allegations that WWiSE qualifies as prior art.¹² *See* Pet. 1–3 (Section III.A.2.). The first paragraph of this section in the Petition provides the following background for WWiSE:

July 2005 WWiSE was a submission made to Task Group n (“TGn”) of the IEEE 802.11 Wireless Local Area Networks (“WLAN”) Working Group. During the 2004-2005 timeframe, IEEE Working Group members could provide submissions. (INTEL-1007, ¶15.) Members made these submissions through

¹² Dr. Lansford testifies to “hav[ing] held numerous leadership positions in IEEE 802 over the last 25 years,” and much relevant corporate and academic employment. Ex. 1007 ¶¶ 5–13.

the IEEE 802 Wireless World website, <http://802wirelessworld.com>. (INTEL-1007, ¶16; INTEL-1038 (New Participant Orientation Slides), 35-37; INTEL-1039 (July 2004 Meeting Minutes), 5.)

Id. at 1–2. With regard to public accessibility of WWiSE, Petitioner asserts:

All submissions were accessible to any member of the public after free registration through the Wireless World website. (INTEL-1007, ¶18; INTEL-1038 (New Participant Orientation Slides), 25-30 (describing process of becoming a member).) After creating an account, an individual could view the “Working Group Document Listing” and download any submissions that had been uploaded. (INTEL-1038 (New Participant Orientation Slides), 35; INTEL-1007, ¶18.) Submissions were also publicly available to any member of the public via FTP at <ftp.wirelessworld.com>. (INTEL-1007, ¶19; INTEL-1038 (New Participant Orientation Slides), 35 (describing process for creating a free account).) The FTP server’s address and login credentials were also publicly available. (INTEL-1007, ¶19, *citing* INTEL-1033 and INTEL-1034)).

In mid-2007, the IEEE’s current Mentor website (“Mentor”) replaced the Wireless World website. (INTEL-1007, ¶21.) Prior submissions uploaded to the Wireless World server were added to Mentor shortly after its creation. (INTEL-1007, ¶21.) The uploaded documents retained their original submission upload dates. (INTEL-1007, ¶21.) Mentor and all its documents have been freely available to members of the public since soon after its creation in 2007 and before August 21, 2009. (INTEL-1007, ¶21.) Entries in Mentor were and remain searchable by year, task group, title, or other parameters. (INTEL-1007, ¶22.)

WWiSE was uploaded to the IEEE database on July 9, 2005, at which time it would have been available to interested members of the public through the Wireless World website or by FTP. (INTEL-1007, ¶¶18-29, 24.) After mid-2007 and before August 21, 2009, July 2005 WWiSE would have been available to interested members of the public through Mentor. (INTEL-1007, ¶¶18-18 [sic], 21, 24.) Interested members of

the public would have been aware of the proposals made to IEEE by WWiSE because they were frequently discussed in 2004 and 2005 in industry publications. (*See, e.g.*, INTEL-1033–1037.)

Id. at 2–3. Petitioner contends that, “[f]or at least these reasons, WWiSE was publicly accessible prior to the earliest possible priority date of the ’[262] patent to a person of ordinary skill in the art (‘POSITA’) exercising reasonable diligence.” *Id.* at 3.

Patent Owner argues:

To be clear, . . . WWiSE was not a published standard, a draft standard, or even a working draft. It was merely one of many thousands of submissions to one of many dozens of working groups addressing the 802.11 standard. AXW-2003 (898 pages of 100 submissions per page in 802.11, with roughly 21,700 of those submissions before the relevant 2009 date); AXW-2004 (showing *over 100* working groups addressing the 802.11 standard). The TGn working group *alone* received approximately 4,600 submissions before the relevant date in 2009. AXW-2005.

[Petitioner] failed to establish that a reasonably diligent POSA looking for extended-range teachings would have found . . . July 2005 WWiSE among all of these documents.

Prelim. Resp. 4.

Petitioner alleges and provides evidence that July 2005 WWiSE was posted to, and continuously publicly available from, sources maintained by IEEE from July, 2005, until the earliest priority date of the ’707 patent. Petitioner further alleges and provides evidence that any interested member of the public could access July 2005 WWiSE during this time period. Although Patent Owner contends that WWiSE could not have been located by a skilled artisan, Petitioner’s evidence shows that WWiSE was made available to members of the TGn Task Group of the IEEE 802.11 WLAN

Working Group without any restrictions of confidentiality or limits on dissemination. And, Petitioner provides evidence that interested members of the public would have known to look for WWiSE because the proposals made to IEEE in this time frame were frequently discussed in industry publications. In addition, we note that WWiSE lists over fifty contributors that were associated with a wide variety of technology companies in this space. Ex. 1005, 2–4. The parties may want to consider during trial, and in accordance with our Rules, whether this evidence or otherwise supports public availability.

We determine that Petitioner has established the public accessibility of WWiSE sufficiently for the purpose of institution.

4. Analysis of Claim 1

Petitioner asserts that the combined teachings of Hansen and WWiSE render obvious the subject matter of claim 1 of the '262 Patent. *See* Pet. 9, 19–38. Patent Owner asserts that the subject matter of claim 1 would not have been obvious over Hansen and WWiSE, because a skilled artisan would not have made the combination as set forth in the Petition. *See* Prelim. Resp. 11–47. For the reasons that follow, we are persuaded that Petitioner establishes sufficiently for the purpose of institution that the subject matter of independent claim 1 would have been obvious over the combined teachings of Hansen and WWiSE and, on this basis, we institute *inter partes* review.

Our element-by-element analysis of claim 1 is set forth below.

a. [1Pre] A wireless OFDM (Orthogonal Frequency Division Multiplexing) transceiver operable to:

Petitioner does not take a position on whether the preamble of claim 1 is limiting. *See* Pet. 19. Petitioner contends that Hansen teaches all the elements of the preamble. Pet. 19–20 (reproducing Ex. 1006, Fig. 2; citing Ex. 1003 ¶¶ 98–101; Ex. 1006 ¶¶ 15, 34, 36, 48–51, 77, 79). Hansen discloses “a transceiver comprising a transmitter and a receiver.” Ex. 1005 ¶ 15. Both the transmitter and the receiver implement wireless orthogonal frequency division multiplexing (OFDM). *See id.* at ¶¶ 48, 51. At this stage of the proceeding, we need not determine whether the preamble of claim 1 is limiting as Petitioner has shown sufficiently for the purpose of institution that Hansen teaches all the elements of the preamble of claim 1.

b. [1A] receive, in a first narrower frequency band, by a receiver using wireless OFDM communications, a first packet comprising a first number of OFDM symbols that carry a first plurality of header bits;

As discussed immediately above with regard to the preamble, Petitioner has shown that Hansen discloses a receiver that implements wireless OFDM communications. With specific regard to the wireless OFDM receiver element of this limitation, Petitioner points to the receiver portion 201 of Hansen’s transceiver depicted in Figure 2b and described in the related explanation as teaching that element. Pet. 21–22 (reproducing Ex. 1006, Fig. 2b; citing Ex. 1003 ¶ 101; Ex. 1006 ¶¶ 41, 50). Petitioner asserts that Hansen discloses receiving a first packet comprising a first number of OFDM symbols that carry a first plurality of header bits in the form of a physical layer protocol data unit (“PPDU”), a type of packet in 802.11. Pet. 22 (citing Ex. 1006 ¶ 59).

As to “in a narrower frequency band” aspect of this claim limitation, Petitioner asserts that Hansen’s PPDU is analogous to the 802.11 PPDUs in WWiSE that are transmitted and received, in mixed mode operation, in the 20 MHz frequency band. Pet 22–23 (reproducing Ex. 1005, Figs. 3, 8; citing Ex. 1005, 59, 67). According to Petitioner, “Hansen’s transceiver also supports communications over the 20 MHz and 40 MHz frequency bands, including communications based on WWiSE’s proposal.” Pet. 23 (citing Ex. 1003 ¶ 103; Ex. 1006 ¶¶ 67–68, 79).

Regarding the packet comprising a first number of OFDM symbols element of this limitation, Petitioner asserts that the WWiSE describes Extended Range (ER) capable device that support the optional ER modulating and coding scheme (MCS) in addition to the Normal Range (NR) MCS. *See* Pet. 24 (citing Ex. 1005, 15, 50, 69). Petitioner contends that WWiSE further discloses that ER capable devices can communicate using the long SIG-N field format or the SIG-N MIMO-OFDM symbol followed by a second MIMO-OFDM symbol denoted as ER-SIG-N that repeats SIG-N. *See* Pet. 24–25 (reproducing Ex. 1005, Fig. 8 (with color annotations added); citing Ex. 1003 ¶ 108; Ex. 1005, 50, 58–59 67, 69–70, 83). Petitioner further asserts that WWiSE discloses another OFDM symbol, denoted SIGNAL-MM or SIG-MM. Pet. 25 (citing Ex. 1005, 67, 70–71). According to Petitioner, “[c]ollectively SIG-N, ER-SIG-N, and SIG-MM correspond to the claimed ‘first number of OFDM symbols in a first packet.’” *Id.* (citing Ex. 1003 ¶ 109).

As to the carrying a first plurality of header bits aspect of this claim limitation, Petitioner asserts that WWiSE discloses that the SIG-N field appears within the MIMO-OFDM PLCP header, and the SIG-MM field

includes additional bits, appears in the mixed-mode packet header, and is sent in the PLCP header. *See* Pet. 25 (citing Ex. 1003 ¶¶ 110–112; Ex. 1005, 50, 58–59, 67, 69–71, 92, 95, Figs. 3, 8; Ex. 1006 ¶¶ 59, 79–81).

Petitioner has shown sufficiently for the purpose of institution that the combination of Hansen and WWiSE teaches all the elements of this limitation of claim 1.

c. [1B] demodulate, by a demodulator connected to and in communication with the receiver, the first number of OFDM symbols to determine the first plurality of header bits, wherein at least one header bit of the first plurality of header bits in the first packet is repeated on a plurality of OFDM subcarriers;

Petitioner relies on Hansen for teaching a demodulator to demodulate OFDM symbols. *See* Pet. 26–27 (citing Ex. 1003 ¶ 115). In the detailed description of Figure 2b (*see also id.* at 27), Hansen discloses:

In the receiver 201, the plurality antenna front end and A to D conversion blocks 216a, . . . , 216n may receive analog RF signals via an antenna. . . . Each FFT [Fast Fourier Transform] block 220a, . . . , 220n may receive a signal from an antenna front end and A to D conversion block 216a, . . . , 216n, independently applying an n-point FFT technique, **demodulating** the signal by a plurality of carrier signals based on then sub-band frequencies utilized in the transmitter 200. The **demodulated** signals may be mathematically integrated over one sub band frequency period by each of the plurality of FFT blocks 220a, . . . , 220n to extract n symbols contained in each of the plurality of **OFDM** signals received by the receiver 201.

Ex. 1006 ¶¶ 50–51 (emphasis added). Petitioner contends that Hansen’s FFT is connected to, and in communication with, the Digital/Analog converter or receiver that receives incoming packets. Pet. 27–28.

According to Petitioner, a person of ordinary skill in the art “would have understood the collection of FFTs to be a demodulator.” Pet. 28 (citing

Ex. 1003 ¶ 115). Petitioner further asserts that “WWiSE’s packets (including the header fields) would have to be demodulated before decoding and processing.” Pet. 28 (citing Ex. 1003 ¶ 116; Ex. 1005, 58). According to Petitioner, a person of ordinary skill in the art

would have had a reasonable expectation of success in using Hansen’s demodulator to demodulate WWiSE’s packets because they are compatible with the same versions of 802.11, because Hansen expressly refers to packet structures in WWiSE, and because WWiSE uses header symbols (*e.g.*, SIGN or Signal-N) analogous to those in the PPDU’s of Hansen.

Pet. 28 (citing Ex. 1003 ¶ 116; Ex. 1005, 69; Ex. 1006 ¶¶ 77, 79).

Petitioner further asserts that the FFTs in Hansen’s transceiver demodulate the SIG-N, ER-SIG-N, and SIG-MM header symbols in WWiSE’s mixed-mode, ER packet to determine the header bits within each symbol. *See id.* (citing Ex. 1003 ¶ 118; Ex. 1005, 58–59, 67, 69–71, 83). Petitioner contends that Hansen’s FFT demodulates the SIG-N, ER-SIG-N, and SIG-MM header symbols in WWiSE’s mixed mode, ER packet to determine the header bits within each symbol. *See id.* (citing Ex. 1003 ¶ 118; Ex. 1005, 58–59, 67, 69–71, 83). According to Petitioner, “[u]pon receiving WWiSE’s PPDU . . . , Hansen’s FFT . . . demodulates the received OFDM signals to extract the header symbols from which Hansen’s transceiver would determine the header bits.” Pet. 28–29 (reproducing Ex. 1006, Fig. 2b; citing Ex. 1006 ¶¶ 51, 54–55).

Regarding the at least one header bit of the first plurality of header bits in the first packet is repeated on a plurality of OFDM subcarriers element of this claim limitation, Petitioner asserts WWiSE discloses a frequency permute function when transmitting bits in the ER-SIG-N header field, which is a duplicate SIG-N. *See* Pet. 30 (reproducing Ex. 1005, Fig. 8 (with

color annotation added)). According to Petitioner, “[a]s a result, each ER-SIG-N bit is indexed to a distinct OFDM subcarrier from the corresponding SIG-N bit.” *Id.* (citing Ex. 1003 ¶ 119; Ex. 1005, 69).

Petitioner has shown sufficiently for the purpose of institution that the combination of Hansen and WWiSE teach all the elements of this limitation of claim 1.

d. [1C] receive, in a second wider frequency band, by the receiver using wireless OFDM communications, a second packet comprising a second number of OFDM symbols, less than the first number of OFDM symbols, that carry a second plurality of header bits, different than the first plurality of header bits; and

As discussed above, Petitioner has shown that Hansen discloses a receiver that implements wireless OFDM communications. As to “in a second wider frequency band” aspect of this claim limitation, Petitioner asserts that Hansen’s receiver can receive packets like WWiSE’s mixed mode packets in the 20 MHz and 40 MHz frequency bands. *See* Pet. 31–32 (reproducing Ex. 1006, Fig. 2b; citing Ex. 1006 ¶ 65; Pet. 21–26). With specific regard to the second packet comprising a second number of OFDM symbols less than the first number of OFDM symbols element of this claim limitation, Petitioner asserts WWiSE discloses ER packets for improved reliability and NR mixed-mode packets received in 40MHz. *See* Pet. 33 (reproducing Ex. 1005, Fig. 3; citing Ex. 1003 ¶ 124). Petitioner asserts that the mixed mode packets include SIG-MM and SIG-N OFDM symbols but do not include the ER-SIG-N symbol for ER operation. *See id.* (citing Ex. 1003 ¶ 124; Ex. 1005 ¶¶ 58, 68–70, Figs. 11–14; Pet. 21–26).

As to the second header bits being different from the first header bits aspect of this claim limitation, Petitioner contends that the header bits of

WWiSE's second packet (non-ER, mixed mode packet) does not include the ER-SIG-N field that appears in the first packet (ER, mixed mode packets). *See* Pet. 34–35 (reproducing Ex. 1005, Figs. 3, 8 (with color annotations added); citing Ex. 1005, 58–59, 67–71, 83).

Petitioner has shown sufficiently for the purpose of institution that the combination of Hansen and WWiSE teach all the elements of this limitation of claim 1.

e. [1D] demodulate, by the demodulator, the second number of OFDM symbols to determine the second plurality of header bits,

As explained above, Petitioner has shown sufficiently for the purpose of institution that Hansen and WWiSE teach a demodulator to demodulate OFDM symbols. Petitioner asserts Hansen's transceiver demodulates the SIG-N, and SIG-MM header symbols of WWiSE's NR, mixed-mode packet to extract the bits before decoding and processing the payload. *See* Pet. 37 (citing Ex. 1003 ¶ 129; Ex. 1005, 58–59, 67, 69–71, 83). According to Petitioner, “[u]pon receiving WWiSE's PPDU . . . , Hansen's FFT . . . demodulates the received OFDM signals to extract the header symbols from which Hansen's transceiver ultimately determines the header bits.” *Id.* (citing Ex. 1006 ¶¶ 51, 54–55).

Petitioner has shown sufficiently for the purpose of institution that the combination of Hansen and WWiSE teach all the elements of this limitation of claim 1.

f. [1E] wherein the first narrower and second wider frequency bands have one or more overlapping frequency regions.

Petitioner asserts that WWiSE discloses 20/40 MHz frequency bands and discloses the 40 MHz frequency band comprises a primary 20 MHz

band with frequency regions that overlap the 40 MHz band. Pet. 38 (citing Ex. 1003 ¶ 131; Ex. 1005, 14, 49, 84; Pet. 31–32).

Petitioner has shown sufficiently for the purpose of institution that Hansen and WWiSE teach all the elements of this limitation of claim 1.

g. Rationale to Combine the Teachings of Hansen and WWiSE

Petitioner contends a person of ordinary skill in the art “would have been motivated to combine Hansen and WWiSE.” Pet. 13 (citing Ex. 1003 ¶ 87). Specifically, Petitioner contends a person of ordinary skill in the art “would have been motivated to program Hansen’s processors to generate duplicate (i.e., repeated) header fields such as Signal*-N of Hansen’s Fig 6a during ER communications, as taught by WWiSE” and “include support for the fields . . . necessary to support ER in Hansen’s transceiver.” *Id.* at 13–14 (citing Ex. 1003 ¶¶ 87, 89).

In support, Petitioner asserts that “Hansen repeatedly suggests the combination” by “defin[ing] a compromise proposal based on aspects of both January 2005 WWiSE and the TGN Sync proposal[s]” submitted to the IEEE TGn Group working on the 802.11n standard. Pet. 14–15 (citing Ex. 1006, code (54), ¶¶ 6, 7, 14, 21–23, 33, 77, 79, 82). According to Petitioner,

Based on the suggestion to bridge the gap between the WWiSE and TGn Sync industry groups, a [person of ordinary skill in the art] would have been motivated to combine the teachings of WWiSE with Hansen to support the newly introduced aspects of the March WWiSE proposal, including support for WWiSE’s ER features.

Pet. 15 (citing Ex. 1003 ¶ 90).

We determine that Petitioner’s showing that a person of ordinary skill in the art would have had reasons to combine the relevant teachings of

Hansen and WWiSE based on the express suggestion in Hansen is reasonable and supported.

Petitioner further contends the combination of Hansen and WWiSE “involves the use of a known technique to improve similar devices in the same way”—the use of WWiSE’s ER capability based on repeating the SIG-N header field to improve Hansen’s transceiver by providing additional diversity. *See* Pet. 15 (citing Ex. 1003 ¶ 91); *see also id.* at 15–16 (discussing fading channels and WWiSE’s ER capability introducing temporal diversity (citing Ex. 1003 ¶¶ 91–92; Ex. 1005 ¶¶ 67–69; Ex. 1015, 130; Ex. 1022, 947)). Petitioner asserts that a person of ordinary skill in the art “would have been motivated to include WWiSE’s ER capability to improve robustness of communication.” Pet. 16 (citing Ex. 1003 ¶ 93). According to Petitioner, a person of ordinary skill in the art would have understood that WWiSE’s ER capability permits communication in noisy or otherwise degraded channel conditions. Pet. 16–17 (citing Ex. 1003 ¶ 93). Similarly, Petitioner contends the combination of Hansen and WWiSE “is merely the application of a known technique [] to a known device [] that was ready for improvement.” *See* Pet. 17 (citing *KSR*, 415–421). Petitioner contends “[t]he addition of support for WWiSE’s ER capability to Hansen’s transceiver would extend the range of reliable communication between devices by providing diversity when environmental conditions (fading and/or noise) adversely affect communication.” *Id.* (citing Ex. 1003 ¶ 94). We determine these arguments are reasonable and supported.

Petitioner further contends, “this combination is merely of prior art elements according to known methods to yield predictable results (*i.e.*,

extended range for devices in a WLAN.” Pet. 17 (citing *KSR*, 550 U.S. at 416). In support of this argument, Petitioner contends,

the combination adds a repeated data field (known method) to the PPDU frame (prior art element) and adds a one-bit sub-field . . . to the header field. A [person of ordinary skill in the art] would have known how to make these modifications because the addition of fields/sub-fields to network packets was commonly done to implement enhanced features or otherwise support modifications to standards such as 802.11. (INTEL-1003, ¶95.) For example, both Hansen and WWiSE discuss modifications to existing 802.11 PPDUs by the addition of fields and sub-fields. (INTEL-1003, ¶95.)

Id. at 17–18. This argument is reasonable and supported.

With regard to a reasonable expectation of success, Petitioner asserts

The results of this combination would have been predictable, and a [person of ordinary skill in the art] would have had a reasonable expectation of success. (INTEL-1003, ¶96.) Both Hansen and WWiSE describe PPDUs for use in the 802.11n standard being developed. Existing 802.11 standards, which both Hansen and WWiSE build upon, would have been well-known to a [person of ordinary skill in the art] by the earliest priority date of the ’262 patent. (INTEL-1003, ¶96.) And as discussed above, the combination adds fields/sub-fields to an existing packet structure. (INTEL-1003, ¶96.) Because such modifications were commonplace when dealing with evolving communications technologies, the results would have been predictable, and a [person of ordinary skill in the art] would have had a reasonable expectation that the combination would operate successfully. (INTEL-1003, ¶96.)

Pet. 18. This argument also is reasonable and supported.

In summary, we determine that the articulated reasons for combining the relevant teachings of Hansen and WWiSE as set forth in the Petition is sufficient to support institution.

h. Petitioner's Arguments Challenging Reasons to Combine

Patent Owner summarizes its argument as follows:

The Petition plucks just the repeated header of the Extended Range mode from . . . WWiSE, and blindly adds it to Hansen, without considering any of the details surrounding the combination. As explained below, [Petitioner] (1) ignores the range-enhancing features Hansen already has, as well as the differences between Hansen and . . . WWiSE; (2) cherry-picks the use of repeated headers from . . . WWiSE without considering how or why it is used; and (3) fails to recognize that in its proposed combination, a receiving device would not know whether it is receiving a normal range or extended range PPDU, and therefore would not be able to properly receive PPDU's. Considering these details—absent hindsight—a POSA would not have been motivated to arrive at the claimed inventions as [Petitioner] posits.

Prelim. Resp. 22–23¹³ For the reasons set forth below, even in light of Patent Owner's arguments to the contrary, we determine that the Petition has sufficient merit to support institution of trial.

To begin, Patent Owner does not dispute that WWiSE discloses a repeated header in its extended range mode nor does Petitioner dispute that

¹³ Patent Owner's arguments regarding the "details" of the cited art seems to suggest that showing a motivation to combine the relevant teachings of the cited art requires a showing that all the "details" of the cited art beyond the relevant teachings be consistent. This is more than the law of obviousness requires. *Omega Patents, LLC v. BMW of North America, LLC*, No. 2022-2012, slip. op. at 7 (Fed. Cir. January 22, 2024) ("Obviousness is determined based on 'what the combined *teachings* of the references would have suggested to those having ordinary skill in the art' and 'does not require an actual, physical substitution of elements.'" (quoting *In re Mouttet*, 686 F.3d 1322, 13332–33 (Fed. Cir. 2012))).

Hansen teaches the remaining limitations of claim 1.¹⁴ *See generally* Prelim. Resp. And, Patent Owner fails to directly address Petitioner’s contention that Hansen expressly suggests the combination. As noted above, we determine that the Petition’s showing as to reasons to combine the relevant teachings of Hansen and WWiSE is reasonable and supported.

We also note that Patent Owner appears to acknowledge that a skilled artisan would have recognized the benefit of extending the operating range of a wireless OFDM transceiver and Patent Owner does not suggest that a skilled artisan would not be motivated to consider ways to extend the range as much as possible. And, although Patent Owner points to other methods of extending the range that are used in the cited art (i.e., beamforming and diversity),¹⁵ Patent Owner does not argue or provide any evidence that these methods are incompatible with incorporating WWiSE’s ER capability into Hansen’s PPDU to extend the range of successful communication between devices. Overall, we determine that the presentation in the Petition has greater merit than the contrary arguments in the Preliminary Response.

¹⁴ Patent Owner and its declarant, Dr. Haas, appear to acknowledge that repeating headers was known and that adding repeated headers to Hansen was within the capability of a skilled artisan. *See* Prelim. Resp. 34 (“Indeed, a [person of ordinary skill in the art] would have understood that, since basic repetition was known, additional range extension would have been desirable, Hansen could have considered adding repeated headers.”) (citing Ex. 2001 ¶ 132).

¹⁵ Patent Owner’s declarant, Dr. Haas, testifies that a person of ordinary skill in the art “would have understood that wireless is a series of tradeoffs, and there are numerous approaches to improving range such as repetition, beamforming, antenna diversity, MIMO, changing code rates, changing modulation modes, changing carrier frequency, changing transmit power, changing RF hardware, etc.” Ex. 2001 ¶ 132.

Patent Owner argues that “[b]ecause Hansen already has improved range performance, a [person of ordinary skill in the art] would not look to . . . WWiSE for anything more.” Prelim. Resp. 23. We do not agree with the premise of this argument. If improved range performance was recognized as beneficial, we do not understand, and Patent Owner has not adequately established, why a skilled artisan would not look for additional known ways to improve range performance such as repetition. In addition, we note that it is not necessary that the modification to Hansen based on teachings in WWiSE is “the *best* option, only that it be a *suitable* option.” *Par Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1198 (Fed. Cir. 2014).

Patent Owner presents arguments relating to specific technical differences between Hansen and WWiSE that Petitioner allegedly fails to consider. *See* Prelim. Resp. 24–31. Patent Owner argues that Petitioner “ignores significant technical differences between Hansen and . . . WWiSE regarding range capabilities” (*id.* at 24) and “ignores the critical differences between how the header bits are sent in Hansen and . . . WWiSE” (*id.* at 24). The basis of this argument is that WWiSE uses less robust modulation for its header than Hansen. *See id.* at 24–31. Patent Owner argues that a person of ordinary skill in the art “would thus have understood the legacy 802.11 standards at the time of invention and would thus have understood from Hansen’s explanation that the Signal*-N field is rate ½ coded and transmitted using BPSK modulation, consistent with the legacy 802.11 devices referenced in Hansen” (*id.* at 24) and “[b]y contrast, . . . WWiSE uses less robust QPSK modulation for its header” (*id.* at 25). Patent Owner contends:

This underscores what a [person of ordinary skill in the art] would have known—the higher order QPSK of . . . WWiSE has worse range performance than the lower-order BPSK of Hansen. AXW-2001 ¶¶48, 111-113. And the repetition in . . . WWiSE, at best, puts it back on par with Hansen’s BPSK—it does not improve it. AXW-2001 ¶114.

Id. at 28–29.

We do not agree with Patent Owner’s arguments because Patent Owner does not explain why, if WWiSE has less robust modulation that results in worse range performance, its header would not benefit from, and have greater range performance, when incorporated into the header of Hansen. Patent Owner supports its arguments with citations to the Declaration of Zygmunt Haas, Ph.D. (Ex. 2001) and Petitioner supports its combination of the references with citations to the Declaration of Thomas LaPorta, Ph.D. (Ex. 1003). At this stage of the proceeding, we determine that Petitioner’s arguments and evidence, even when considered in light of Patent Owner’s arguments and evidence, has sufficient merit to support institution of trial. Petitioner has not yet been provided with the opportunity to respond to this highly technical argument and we feel that we would benefit from the development of the trial record before making any final decision on this issue (if presented by the full trial record).

Patent Owner argues that Hansen already has the range-extending features of beamforming (*see* Prelim. Resp. 29) and diversity (*id.* at 29–30), and this “would suggest to a [person of ordinary skill in the art] that there is no reason to combine” Hansen and WWiSE (*id.* at 29 (citing Ex. 2001 ¶ 115)) or suggest Petitioner has used hindsight in forming the asserted combination (*id.* at 29–30). Again, at this stage, we do not find much merit in these arguments as Patent Owner fails to explain, or provide evidence

that, a skilled artisan would not combine the teachings of the cited references in an attempt to achieve greater range than the range provided by the separate teachings of either reference.

Patent Owner argues, “the extended range in . . . WWiSE would add redundancy to [] Hansen’s compromise greenfield PPDU reducing overall throughput—contradicting the teachings of Hansen to reduce overhead and improve throughput.” Prelim. Resp. 23. In support of this argument, Patent Owner contends:

Hansen explains that a green field PPDU—which the Petition relies on—provides benefits, including use of “more robust transmission” with “comparable data rates” by *eliminating* portions of the PPDU overhead. INTEL-1006 [0027]; *see id.* Abstract, [0033], [0072]-[0075], [0096]; AXW-2001 ¶¶93-94. [Petitioner] never addresses this either. Absent a compelling reason to do so, a [person of ordinary skill in the art] would not have added redundant bits to Hansen’s greenfield PPDU overhead—as [Petitioner]’s combination does—against Hansen’s teachings. AXW-2001 ¶118.

Id. at 31. Petitioner, however, provides a facially good reason to add the redundant bits—to extend the range of communications. And, in the combination proposed by Petitioner, the bits that Hansen proposes to eliminate (the preamble and header bits used for legacy or mixed media communications that may not be necessary for greenfield access communication as taught in Hansen (*see, e.g.*, Ex. 1006 ¶33)) can still be eliminated. At least at this stage of the proceeding, we do not find much merit in this argument.

Patent Owner argues that Petitioner “Cherry-Picks One Feature Out of . . . WWiSE While Failing to Consider the Prior Art References for All Their Teachings.” Prelim. Resp. 31 (emphasis omitted). Specifically, Patent

Owner alleges that Petitioner “fails to demonstrate a motivation to pluck just the repeated header bits out of . . . WWiSE while ignoring the rest of its teachings, which would greatly complicate any purported combination” (*id.* at 33–34 (citing Ex. 2001 ¶ 125)) and “[t]hus, [Petitioner] has failed to articulate any reason a [person of ordinary skill in the art] would have combined Hansen and . . . WWiSE only to add repeated header bits” (*id.* at 36). But, as shown above, these allegations are incorrect. Petitioner has provided a showing on motivation to combine the relevant teachings of Hansen and WWiSE that we determine, even in light of Patent Owner’s contrary arguments, to be sufficient for institution. *See* Pet. 13–18.

Patent Owner also argues that Petitioner “Fails to Provide Any Rational Reasons to Combine Hansen with . . . WWiSE as in the Petition.” Prelim. Resp. 36 (emphasis omitted). But, here again, Petitioner has articulated several reasons why a skilled artisan would have been motivated to combine the teachings of Hansen with the teachings of WWiSE as set forth in the Petition without relying on hindsight. *See* Pet. 13–18. We determine that the Petition presents sufficient rationale to combine the teachings of Hansen and WWiSE to support institution of trial.

i. Summary for Claim 1

Contrary to Patent Owner’s arguments, we determine that Petitioner has shown a reasonable likelihood of establishing that (1) July 2005 WWiSE is a prior art printed publication and (2) the subject matter of claim 1 is unpatentable as obvious in view of the combination of Hansen and WWiSE. On that basis, we are persuaded that Petitioner has demonstrated a reasonable likelihood of prevailing in showing that at least one of the claims

challenged in the petition is unpatentable and that *inter partes* review should be instituted.¹⁶

5. *Analysis of Independent Claims 9, 17, and 25*

Independent claims 9, 17, and 25 recite limitations similar to the limitations recited in device claim 1, except that claims 17 and 25 are directed to methods. *Compare* Ex. 1001, 12:40–62, *with id.* at 13:18–13:41, 13:64–14:17, 14:41–64. Petitioner relies on its showing for claim 1 in challenging independent claims 9, 17, and 25. *See* Pet. 9–38. Patent Owner does not present any arguments specifically directed to claims 9, 17, and 25. *See generally* Prelim. Resp. For the same reasons as those explained above addressing claim 1, Petitioner shows sufficiently that the limitations of claims 9, 17, and 25 are taught or suggested by the combination of Hansen and WWiSE and that a sufficient rationale to combine the relevant teachings of these references exists. Accordingly, we are persuaded that Petitioner has demonstrated a reasonable likelihood of prevailing in showing that independent claims 9, 17, and 25 are unpatentable over the combination of Hansen and WWiSE.

¹⁶ Thus, we have determined that there is a reasonable likelihood that the Petitioner will prevail with respect to at least one of the claims challenged in the Petition pursuant to 35 U.S.C. § 314 and that *inter partes* review should be instituted. Accordingly, we institute as to all the challenged claims and all the challenges raised in the Petition. 37 C.F.R. §42.108(a) (“When instituting *inter partes* review, the Board will authorize the review to proceed on all of the challenged claims and on all grounds of unpatentability asserted for each claim.”).

6. Analysis of Dependent Claims 2–6, 8, 10–14, 16, 18, 19, 21–24, 26–30, and 32

Petitioner provides an element-by-element analysis showing that all the additional elements recited in dependent claims 2–6, 8, 10–14, 16, 18, 19, 21–24, 26–30, and 32 are taught by Hansen and WWiSE. *See* Pet. 38–45. Patent Owner does not present any arguments specifically directed to claims 2–6, 8, 10–14, 16, 18, 19, 21–24, 26–30, and 32. *See generally* Prelim. Resp. We have considered Petitioner’s showing as to these dependent claims (and, as shown above, independent claims 1, 9, 17, and 25 from which they depend) and we are persuaded that Petitioner has demonstrated a reasonable likelihood of prevailing in showing that dependent claims 2–6, 8, 10–14, 16, 18, 19, 21–24, 26–30, and 32 are unpatentable over the combination of Hansen and WWiSE.

E. Patentability Challenge Based on Zhang and Maltsev

1. Overview of Zhang (Ex. 1017)

Zhang relates “to wireless local area networks that utilize orthogonal frequency division multiplexing (OFDM).” Ex. 1017 ¶ 7. Figure 1 is reproduced below and is described as “a block diagram of an example wireless local area network (WLAN) 10” *Id.* ¶ 64.

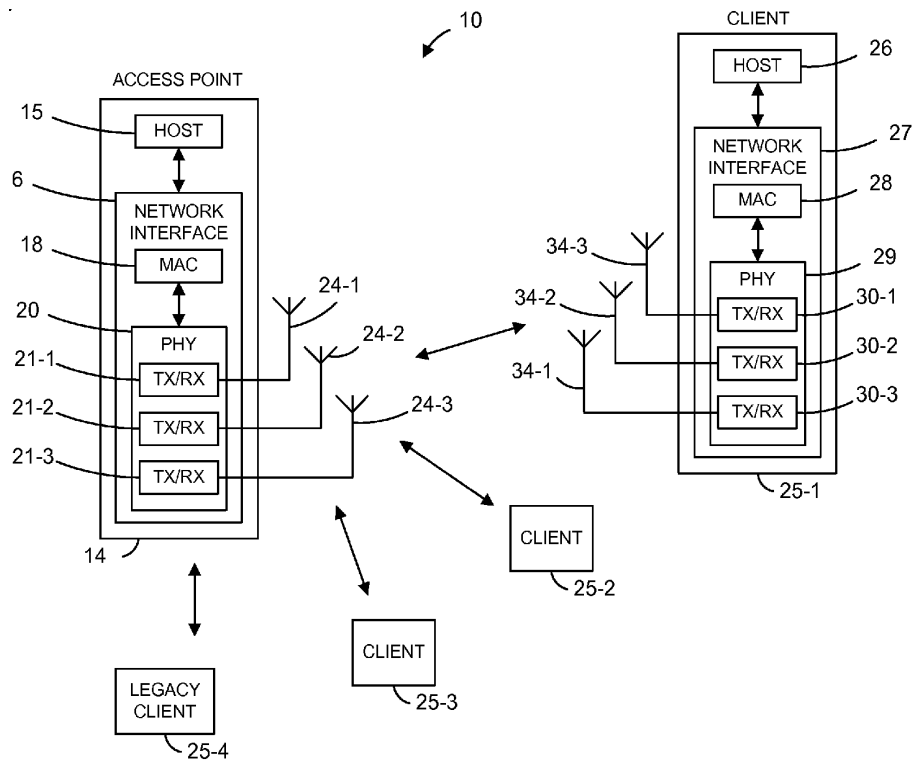


Figure 1 shows that “AP 14 includes a host processor 15 coupled to a network interface 16,” which “includes a medium access control (MAC) unit 18 and a physical layer (PHY) unit 20.” *Id.*

In one embodiment, the MAC unit 18 and the PHY unit 20 are configured to operate according to a first communication protocol (e.g., the IEEE 802.11ac Standard, now in the process of being standardized). In another embodiment, the MAC unit 18 and the PHY unit 20 are also configured to operate according to a second communication protocol (e.g., the IEEE 802.11n Standard). In yet another embodiment, the MAC unit 18 and the PHY unit 20 are additionally configured to operate according to the second communication protocol and a third communication protocol (e.g., the IEEE 802.11a Standard).

Id. “The WLAN 10 includes a plurality of client stations 25,” at least one of which “(e.g., client station 25-1) is configured to operate at least according to the first communication protocol,” and at least one of which “is not

configured to operate according to the first communication protocol but is configured to operate according to at least one of the second communication protocol or the third communication protocol (referred to herein as a ‘legacy client station’).” *Id.* ¶ 65; *see also id.* ¶ 68 (“[T]he client station 25-4 is a legacy client station.”).

Zhang discloses “a method for generating a data unit for transmission via a communication channel, wherein the data unit conforms to a first communication protocol.” *Id.* at code 57. According to Zhang, “the PHY unit 20 of the AP14” and “the PHY unit 29 of the client device 25-1” are “configured to generate data units conforming to the first communication protocol” *Id.* ¶¶ 69, 70.

For example, Zhang describes “a prior art OFDM data unit 90,” which “conforms to the IEEE 802.11n Standard, occupies a 20 MHz band, and is designed for ‘Green field’ situations, i.e., when the WLAN does not include any client stations that conform to the IEEE 802.11a Standard but not the IEEE 802.11n Standard.” *Id.* at ¶ 73 (referring to the prior art data unit format illustrated in Figure 4). Zhang also describes “an OFDM data unit 200,” which “conforms to the first communication protocol and occupies an 80 MHz band” and “is suitable for ‘Greenfield’ situations, i.e., when the WLAN 10 does not include any client stations (i.e., the legacy client station 25-4) that conforms to the IEEE 802.11a Standard and/or the IEEE 802.11n Standard, but not the first communication protocol.” *Id.* ¶ 100 (referring to the data unit format illustrated in Figure 9).

In another example, Zhang describes “a prior art OFDM data unit 78,” which “conforms to the IEEE 802.11n Standard, occupies a 20 MHz band, and is designed for mixed mode situations, i.e., when the WLAN includes

one or more client stations that conform to the IEEE 802.11a Standard but not the IEEE 802.11n Standard.” *Id.* ¶ 72 (referring to the prior art data unit format illustrated in Figure 3). Zhang also describes “an OFDM data unit 250,” which “conforms to the first communication protocol and occupies an 80 MHz band” and “is suitable for ‘mixed mode’ situations, i.e., when the WLAN 10 includes at least one client station (i.e., the legacy client station 25-4) that conforms to the IEEE 802.11a Standard and/or the IEEE 802.11n Standard, but not the first communication protocol.” *Id.* ¶ 102 (referring to the data unit format illustrated in Figure 10).

2. Overview of Maltsev (Ex. 1018)

Maltsev relates “to high-throughput (HT) wideband (WB) communications with wireless local area networks (WLANs).” Ex. 1018, 1:10–12. According to Maltsev, “[o]ne problem with many conventional systems that use symbol-modulated subcarriers is that channel bandwidth is limited by the frame structure employed.” *Id.* at 1:24–27. Maltsev discloses a frame format that “provides for wideband wireless local area network communications and informs narrower-band communication units when the channels are occupied by wider-band communication units.” *Id.* at code (57).

Figure 1 is reproduced below and is described as illustrating “[c]ommunication environment 100 [including] one or more communication units (CUs) 102, which may communicate with one or more access points (AP) 104 over wireless communication links 106.” *Id.* at 2:3–8.

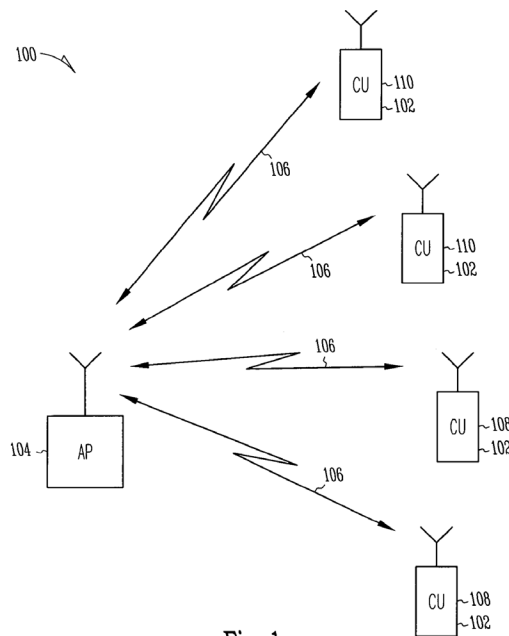


Fig. 1

Maltsev discloses that “APs 104 and CUs 102 may use a frame structure for communicating therebetween, which may be time-division multiplexed to allow communications between many APs 104 and CUs 102 over one or more of the communication channels.” *Id.* at 3:7–11. Maltsev also discloses that “a channel may comprise a plurality of substantially orthogonal subcarriers that may be modulated with a data stream, such as with an OFDM channel.” *Id.* at 3:12–15.

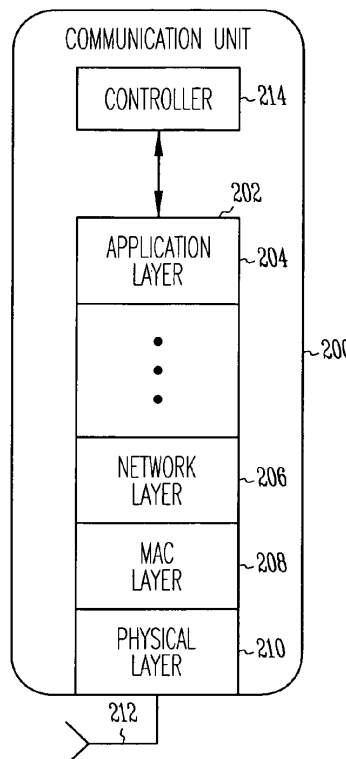
According to Maltsev, “CUs 102 may comprise both wider-band CUs 108 and narrower-band CUs 110.” *Id.* at 3:29–30.

Narrower-band CUs 110 may communicate on a single channel while wider-band CUs 108 may communicate on one or more of the channels to provide wider-bandwidth communications. Wider-band CUs 108 may be referred to as high-throughput (HT) CUs, and in some embodiments, wider-band CUs 108 may communicate in accordance with an IEEE 802.11 standard for HT WLAN communications. Narrower-band CUs 110 may communicate in accordance with the IEEE 802.11(a/g) standard for WLAN communications, although the scope of the

invention is not limited in this respect. The terms narrower-band and wider-band refer to a relative communication bandwidth that may be utilized by the communication units.

Id. at 3:30–42; *see also id.* at 4:38–41 (“[N]arrower-band CUs, such as CUs 110 (FIG. 1) may communicate using a single channel, such as one of channels 302, while wider-band CUs 108 may use one or more of channels 302 simultaneously.”). According to Maltsev, “[t]o facilit[ate] the sharing of channels among narrower-band CUs 110 and wider-band CUs 108, communication packets may have a predetermined frame structure to provide for this flexible channel-width capability.” *Id.* at 3:51–54.

Figure 2 is reproduced below and is described as “a block diagram of a communication unit.” *Id.* at 3:56.



“CU 200 may comprise protocol stack 202, which may include one or more layers, such as application layer 204, network layer 206, medium-access-control (MAC) layer 208, and physical layer (PHY) 210.” *Id.* at 3:61–64.

“Physical layer 210 may generate a physical-layer packet format used to transport transmitted physical layer service data units (SDUs) to peers under the control of MAC layer 208.” *Id.* at 4:16–19. “MAC layer 208 may be responsible for determining operating channels to select, and determining operating modes may be used within a wireless network.” *Id.* at 4:20–23. “MAC layer 208 may also scan or have other means of detecting the presence of narrower-band CUs 110 (FIG. 1), which it may use to select operating channels as well as the type of physical layer packet format to be used.” *Id.* at 4:27–31.

3. Prior Art Status of Zhang

Zhang claims the benefit of the filing dates of several provisional applications, including Provisional Application No. 61/221,900 (Ex. 1019, “the ’900 PROV”), filed on July 30, 2009. Ex. 1017, code 60. Petitioner contends that “Zhang is entitled to priority based on the ’900PROV under 35 U.S.C. §119(e) because Zhang was filed not later than 12 months after the filing date of the ’900 PROV and contains a specific reference to the provisional application.” Pet. 49. Petitioner also argues that “a nonprovisional patent application publication is prior art as of the earlier filing date of a provisional application if the disclosure of the provisional provides 35 U.S.C. § 112 support for at least one claim in the publication” and “the ’900PROV supports at least claim 1 of Zhang.” *Id.* (citing *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1381–82 (Fed. Cir. 2015)). Petitioner provides an element-by-element comparison between claim 1 of Zhang and the disclosure of the ’900PROV. *See* Pet. 50–58.

In response, Patent Owner asserts that Petitioner “failed to . . . show that Zhang is prior art via a priority claims to” the ’900PROV because Petitioner “failed[] to show that ’900PROV was enabling and provides adequate written description support.” Prelim. Resp. 47–48 (citing *Dynamic Drinkware*, 800 F.3d at 1378–79). Patent Owner also provides an element-by element comparison between claim 1 of Zhang and Petitioner’s assertions regarding the disclosure of the ’900PROV. *See* Prelim. Resp. 48–56.

4. Discussion

At this stage of the proceeding, the prior art status of Zhang is the only dispute between the parties as to the patentability challenge based on Zhang and Maltsev. *See* Prelim. Resp. 47–56. For the purpose of institution, we need not determine whether Zhang is entitled to the filing date of ’900PROV, because, as explained above with respect to the unpatentability challenge based on Hansen and WWiSE, we have determined that there is a reasonable likelihood that the Petitioner will prevail with respect to at least one of the claims challenged in the Petition pursuant to 35 U.S.C. § 314. 37 C.F.R. § 42.108(a) (“When instituting *inter partes* review, the Board will authorize the review to proceed on all of the challenged claims and on all grounds of unpatentability asserted for each claim.”).

The ’262 Patent also claims the benefit of the filing date of Provisional Application No. 61/235,909, filed on August 21, 2009. Ex. 1001, codes (22), (60). “Petitioner does not acquiesce that the ’262 patent is entitled to the priority date of the ’909 provisional.” Pet. 1. We look forward to the development of the full trial record as to the prior art status of Zhang to the ’262 Patent. We note that, although the burden of

production may shift between the parties during trial on this issue, the burden of persuasion to show that Zhang is prior art to the '262 Patent always remains with Petitioner. *See Dynamic Drinkware*, 800 F.3d at 1379–80.

IV. CONCLUSION

For the foregoing reasons, we determine that the information presented in the Petition establishes a reasonable likelihood that Petitioner would prevail in showing at least one of claims 1–6, 8–14, 16–19, 21–30, and 32 of the '262 Patent is unpatentable under 35 U.S.C. § 103.

V. ORDER

Upon consideration of the record before us, it is:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–6, 8–14, 16–19, 21–30, and 32 of the U.S. Patent No. 9,584,262 is instituted with respect to all grounds set forth in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), *inter partes* review of U.S. Patent No. 9,584,262 shall commence on the entry date of this Order, and notice is hereby given of the institution of a trial.

IPR2023-01143
Patent 9,584,262 B2

PETITIONER:

Lori Gordon
Bryan Banks
Jonathan Carter
PERKINS COIE LLP
gordon-ptab@perkinscoie.com
banks-ptab@perkinscoie.com
carter-ptab@perkinscoie.com

PATENT OWNER:

Giri Pathmanaban
Jonathan Strang
Jacob Vannette
LATHAM & WATKINS LLP
giri.pathmanaban@lw.com
jonathan.strang@lw.com
jake.vannette@lw.com