UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEL CORPORATION,
Petitioner,

v.

AX WIRELESS,
Patent Owner.

IPR2023-01139
Patent 10,917,272 B2

Before TERRENCE W. McMILLIN, JOHN D. HAMANN, and MICHAEL T. CYGAN, *Administrative Patent Judges.*

HAMANN, *Administrative Patent Judge*.

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

I. INTRODUCTION

Intel Corporation ("Petitioner") filed a petition for *inter partes* review of claims 1–3, 5, and 7–9 ("the challenged claims") of U.S. Patent No. 10,917,272 B2 (Ex. 1001, "the '272 patent"). Paper 2 ("Pet."). AX Wireless LLC ("Patent Owner") filed a Preliminary Response. Paper 7 ("Prelim. Resp.").

With our authorization, Petitioner filed a Preliminary Reply to Patent Owner's Preliminary Response to address further the issue of discretionary denial under 35 U.S.C. § 314(a) (2018). Paper 10 ("Prelim. Reply"). Patent Owner filed a Preliminary Sur-reply in response. Paper 11 ("Prelim. Sur-reply")). In addition, Petitioner filed a Notice of Multiple Petitions, ranking the Petition in this proceeding first. Paper 3, 3.

Institution of an *inter partes* review is authorized by statute when "the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a); *see* 37 C.F.R. § 42.108 (2022). Upon consideration of the papers, we conclude that the information presented shows that there is a reasonable likelihood that Petitioner would prevail in establishing the unpatentability of at least one challenged claim of the '272 patent.

A. Real Parties-in-Interest

Petitioner identifies Intel Corporation, as well as Dell Inc., Dell Technologies Inc. (collectively "Dell"), and Lenovo Group Ltd. ("Lenovo") as real parties-in-interest. Pet. 79. Patent Owner identifies AX Wireless, Inc. and IdeaHub, Inc. as real parties-in-interest. Paper 5, 1.

B. Related Matters

The parties identify *AX Wireless LLC, v. Dell Inc.*, 2:22-cv-00277-RWS-RSP (E.D. Tex.); *AX Wireless LLC, v. HP Inc.*, 2:22-cv-00279- JRG-RSP (E.D. Tex.); *AX Wireless LLC, v. Lenovo Group Ltd.*, 2:22-cv-00280-RWS-RSP (E.D. Tex.); and *AX Wireless LLC, v. Acer Inc.*, 2:23-cv-00041-JRG-RSP (E.D. Tex.), as matters that may affect, or be affected by, a decision in this proceeding. Pet. 79–80; Paper 5, 1.

Patent Owner represents that Petitioner also has filed petitions challenging related patents asserted in the district court cases, namely: (i) U.S. Patent No. 9,584,262 (IPR2023-01143); (ii) U.S. Patent No. 9,614,566 (IPR2023-01144); (iii) U.S. Patent No. 9,973,361 (IPR2023-01135); (iv) U.S. Patent No. 10,079,707 (IPR2023-01136); (v) U.S. Patent No. 10,291,449 (IPR2023-01137); (vi) U.S. Patent No. 10,554,459 (IPR2023-01138); and (vii) U.S. Patent No. 11,212,146 (IPR2023-01145). Paper 5, 1.

C. The Challenged Patent

The '272 patent is titled "Non-Transitory Computer-Readable Information Storage Media for Variable Header Repetition in a Wireless [Orthogonal Frequency Division Multiplexing ("OFDM")] Network." Ex. 1001, code (54). The '272 patent relates to an OFDM communication environment having header repetition. *Id.* at 1:32–36. OFDM divides the transmission frequency band into multiple subcarriers, with each subcarrier individually modulating one or more bits. *Id.* at 1:49–54. OFDM may involve a packet, which is "usually formed by a preamble, header, and payload, and transmitted using time-sharing or contention-based media access methods." *Id.* at 1:45–47. The '272 patent describes Institute for

Electrical and Electronics Engineers ("IEEE") 802.11 (Wireless LAN) as an example of such a system. *Id*. at 1:47–49.

Because the header contains important information for decoding the payload, it is essential to decode the header reliably. *Id.* at 1:55–58. The '272 patent describes various ways of communicating a header repetition scheme in a system so that various nodes are aware of the scheme used. *Id.* at 2:51–3:67. One described method modulates header bits onto two OFDM symbols, in a different order. *Id.* at 7:47–8:4.

D. The Challenged Claims

Petitioner challenges claims 1–3, 5, and 7–9 in this proceeding. Claim 1 is the only independent, challenged claim. Claim 1 is illustrative of the challenged claims and is reproduced below:

> 1. A non-transitory computer-readable information storage media, having stored thereon instructions, that when executed by one or more processors in a transceiver, cause to be performed a method comprising:
>
> generating, by a wireless Orthogonal Frequency Division Multiplexing (OFDM) communications transmitter, a first packet type comprising a first header field, wherein the first header field comprises two parts, a first part comprising a first set of header bits of the first header field and a second part comprising a second set of header bits of the first header field, wherein the first set of header bits of the first header field is different than the second set of header bits of the first header field;
>
> generating, by an encoder and a modulator, a first OFDM symbol followed by a second OFDM symbol, wherein the first OFDM symbol is used to transmit the first part of the first header field and the second OFDM symbol is used to transmit the second part of the first header field;
>
> transmitting, by the wireless OFDM communications transmitter, the first packet type over a wireless communication channel;

generating, by the wireless OFDM communications transmitter, a second packet type comprising a second header field, wherein the second header field comprises four parts, a first part comprising a first set of header bits of the second header field, a second part comprising a second set of header bits of the second header field, a third part comprising a third set of header bits of the second header field and a fourth part comprising a fourth set of header bits of the second header field,

wherein the first set of header bits of the second header field is the same as the second set of header bits of the second header field, wherein the third set of header bits of the second header field is the same as the fourth set of header bits of the second header field;

generating, by the encoder and the modulator, a first OFDM symbol followed by a second OFDM symbol followed by a third OFDM symbol followed by a fourth OFDM symbol, wherein the first OFDM symbol is used to transmit the first part of the second header field, the second OFDM symbol is used to transmit the second part of the second header field, the third OFDM symbol is used to transmit the third part of the second header field, the fourth OFDM symbol is used to transmit the fourth part of the second header field,

wherein the second set of header bits of the second header field transmitted using the second OFDM symbol are transmitted in a different order than the first set of header bits of the second header field transmitted using the first OFDM symbol,

wherein the fourth set of header bits of the second header field transmitted using the fourth OFDM symbol are transmitted in a different order than the third set of header bits of the second header field transmitted using the third OFDM symbol; and

transmitting, by the wireless OFDM communications transmitter, the second packet type over the wireless communication channel.

Ex. 1001, 12:52–13:43.

E. Asserted Grounds of Unpatentability

Petitioner asserts that the challenged claims of the '272 patent are unpatentable based on the following grounds:

Claim(s) Challenged	35 U.S.C. §[1]	Reference(s)/Basis
1–3, 5, 7–9	103(a)	Hansen,[2] WWiSE[3]
1–3, 5, 7–9	103(a)	Hansen, WWiSE, Choi[4]

Pet. 4, 10–78. Petitioner submits in support of its arguments the Declaration of Thomas LaPorta, Ph.D. (Ex. 1003) and the Declaration of James L. Langford, Ph.D. (Ex. 1007). Patent Owner submits in support of its arguments the Declaration of Zygmunt Haas, Ph.D. (Ex. 2001).

II. DISCRETIONARY DENIAL UNDER *FINTIV*

Patent Owner argues that we should exercise discretion to deny institution under 35 U.S.C. § 314 due to parallel district court litigation, citing the discretionary-denial factors articulated in *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 5–6 (PTAB Mar. 20, 2020) (precedential) ("*Fintiv*"). *See* Prelim. Resp. 58–63; Prelim. Sur-reply 1–3.

Institution of *inter partes* review is discretionary. *See 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."); 35 U.S.C. § 314(a). 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. *Fintiv*

[1] The Leahy-Smith America Invents Act ("AIA") included revisions to 35 U.S.C. § 103 that became effective on March 16, 2013. Because the '272 patent issued from an application having an effective filing date before March 16, 2013, we apply the pre-AIA version of the statutory basis for unpatentability.
[2] US 2006/0182017 A1, published Aug. 17, 2006 (Ex. 1005, "Hansen").
[3] Cenk Kose & Matthew Fischer, *WWiSE Proposal: High throughput extension to the 802.11 Standard*, Mar. 18, 2005 (Ex. 1006, "WWiSE").
[4] US 2005/0243774 A1, published Nov. 3, 2005 (Ex. 1008, "Choi").

presents six factors, which "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 Director's Memorandum titled *Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation* (June 21, 2022)[5] ("*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 "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 Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 (PTAB Dec. 1, 2020)). 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 litigation brought by Patent Owner, but Petitioner names Dell and Lenovo as real parties-in-interest. *See* Prelim. Reply 1. Petitioner filed stipulations from Dell and Lenovo, which state that they "will not pursue in th[e parallel] litigation the grounds raised or any other grounds that could have reasonably been raised before the PTAB in that instituted proceeding." Exs. 1042, 1043. Petitioner further notes that Patent Owner brought four separate district court proceedings asserting the '272 patent against Dell and Lenovo, as well as against HP Inc. ("HP") and Acer Inc. ("Acer"). *See* Prelim. Reply

[5] *Available at* https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf.

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 by Dell and Lenovo, and the *Fintiv* Memo guidance, the Board should decline to exercise its discretion to deny institution." *Id.* at 1–2.

In light of the Director's *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 Board and district court decisions as to the disputes between Petitioner, Dell, and Lenovo, and Patent Owner.

In the Preliminary Sur-reply, Patent Owner argues that despite Dell's and Lenovo's stipulations, the Petition still includes the same grounds that will be presented in the district court because 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 the 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.* at 1–2 (citing Ex. 2034, 3).

Patent Owner argues that Petitioner bears the burden of showing that institution is warranted but never explains why the HP or Acer district court proceedings "do not raise the same 'concerns of inefficiency and the possibility of conflicting decisions' as the Dell and Lenovo" district court proceedings. Prelim. Sur-reply 2 (citing *Fintiv* Memo 7 (quoting *Fintiv*, Paper 11 at 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 (Prelim. Reply 1 n.1), but carefully avoids stating so in a transparent attempt to avoid its routine discovery obligations."

As an initial matter, Patent Owner for the first time in the Preliminary Sur-reply contends that we should exercise discretion to deny institution on the basis of the HP and Acer district court proceedings. 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. 58–59. Patent Owner's arguments concerning HP and Acer are belated and outside the proper scope of a 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")[6] 74 (citing 37 C.F.R. § 42.23). It "does not mean proceed in a new direction with a new approach as compared to the positions taken in a prior filing." *Id.*

[6] *Available at* https://www.uspto.gov/TrialPracticeGuideConsolidated.

In any event, even if we were to consider Patent Owner's belated arguments, Patent Owner does not direct us to sufficient 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's and Acer's actions, including whether they raise these same grounds of unpatentability in their respective district court proceedings, should not be imputed to Petitioner.

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

III. LEVEL OF ORDINARY SKILL IN THE ART

To determine whether an invention would have been obvious at the time it was made, we consider the level of ordinary skill in the pertinent art at the time of the invention. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). In assessing 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) (citing *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962–63 (Fed. Cir. 1986)). "[O]ne or more factors may predominate." *Id.*

Petitioner argues that one of ordinary skill in the art "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 the field of wireless communication protocols, or an equivalent combination of education and experience." Pet. 9 (citing Ex. 1003 ¶ 62).

Patent Owner does not identify a level of skill in the art that one would have had at the time of the invention of the '272 patent or identify any shortcoming in Petitioner's formulation. Prelim. Resp. 2.

For purposes of this Decision, we adopt Petitioner's definition of the level of skill for one of ordinary skill in the art. Pet. 9. As adopted, we view the definition for the level of ordinary skill is consistent with the '272 patent and the asserted prior art, and we apply it in our analysis below.

IV. CLAIM CONSTRUCTION

Because the Petition was filed after November 13, 2018, we apply the same claim construction standard that would be used in a civil action under 35 U.S.C. § 282(b), following the standard articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). 37 C.F.R. § 42.100(b); 83 Fed. Reg. 51,340, 51,340–41, 51,343 (Oct. 11, 2018). In applying such standard, claim terms generally are given their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art, at the time of the invention and in the context of the entire patent disclosure. *Phillips*, 415 F.3d at 1312–13. "In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence." *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

Here, neither party sets forth any term for claim construction. Pet. 10; Prelim. Resp. 3. Thus, for purposes of our Decision on Institution, we afford the claim terms their plain and ordinary meaning. *See, e.g.*, *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d

795, 803 (Fed. Cir. 1999)) ("[W]e need only construe terms 'that are in controversy, and only to the extent necessary to resolve the controversy.'").

V. PRINCIPLES OF LAW

A 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 of the invention to a person having ordinary skill in the art. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of non-obviousness, if present.[7] *See Graham*, 383 U.S. at 17–18. When evaluating a claim for obviousness, we also must "determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue." *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

VI. ALLEGED OBVIOUSNESS OVER HANSEN AND WWISE

Petitioner argues that the combination of Hansen and WWiSE renders claims 1–3, 5, and 7–9 obvious. Pet. 10–70. For the reasons that follow, we determine that Petitioner establishes a reasonable likelihood that it would prevail in showing that the combination of Hansen and WWiSE renders at least one of these challenged claims obvious.

[7] Patent Owner does not present arguments or evidence of such objective evidence of non-obviousness. *See generally* Prelim. Resp.

A. Summary of Hansen

Hansen is titled "Method and System for Compromise Greenfield Preambles for 802.11N." Ex. 1005, code (54). Hansen relates to a standard to enable Wireless Local Area Network ("WLAN") devices to achieve throughput rates beyond 100 Mbits/s. *Id.* ¶ 9. Hansen describes efforts by the IEEE organization to evaluate proposals from industry groups, such as TGn Sync and WWiSE, as candidates for incorporation in next generation wireless networks for IEEE 802.11n. *Id.* ¶¶ 9, 33, 66 (disclosing "an exemplary L-SIG field for mixed mode access in accordance with a TGn Sync proposal"). Hansen promotes compromise greenfield preambles for 802.11n, "which utilizes a channel sounding mechanism to communicate information between a transmitter and a receiver." *Id.* ¶ 27. Hansen describes a transmitter 200 that includes a coding block 202, puncture block 204, interleaver block 206, mapper blocks 208, inverse fast Fourier transform ("IFFT") blocks 210, beamforming block 212, and digital to analog conversion blocks 214. *Id.* ¶ 41. The interleaver block rearranges bits received in a coding rate-adapted data block from the puncture block to reduce the probability of data corruption impacting contiguous bits. *Id.* ¶ 45. Each IFFT block subdivides the bandwidth of the RF channel into a plurality of n sub-band frequencies to implement OFDM. *Id.* ¶ 48.

B. Summary of WWiSE

WWiSE proposes a high throughput physical layer for operation in the 2.4 and 5 GHz bands, as an extension to the IEEE 802.11 standard. Ex. 1006, 1. WWiSE adds extended range ("ER") protection to prior proposals from its authors. *Id.* WWiSE explains that ER capable devices are devices that support the optional ER Modulation and Coding Scheme ("MCS"), in addition to the normal range ("NR") MCS, and the long SIG-N

field format. *Id.* at 50. WWiSE discusses implementation of greenfield access, in which a Multiple Input Multiple Output ("MIMO") OFDM physical layer (MIMO-OFDM) uses a Media Access Control mechanism to reserve access to the medium. *Id.* at 58, 50 (discussing reservation of access for NR and ER devices). The MIMO-OFDM header contains a SIG-N field that consists of 54 bits that specify all configuration and length-related parameters associated with physical layer protocol data unit ("PPDU") transmission. *Id.* at 59. The transmitted data may constitute multiple MIMO-OFDM symbols, transmitted according to the SIG-N parameters. *Id.* The SIGNAL-N field has an optional "extended communication range" configuration in which SIGNAL-N is comprised of two consecutive MIMO-OFDM symbols. *Id.* at 69. The first symbol is SIG-N, and the second symbol, denoted ER-SIG-N, is derived from SIG-N by applying a permutation on the subcarrier indices of the OFDM data symbols comprising SIG-N. *Id.* The ER feature is used only with binary phase-shift keying ("BPSK") modulation. *Id.* The SIG-N field includes a REXT bit (37th in order of the 54 SIG-N bits) that indicates extended range communication. *Id.* WWiSE illustrates a duplicate SIG-N for extended range communication in Figure 7:

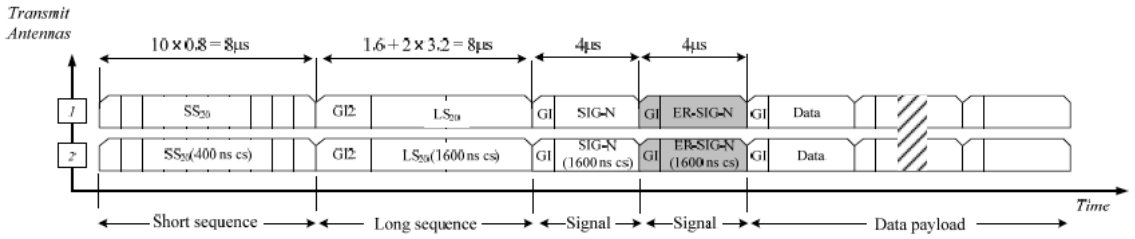


Figure 7 depicts a Physical Layer Convergence Protocol ("PLCP") preamble field, followed by SIG-N, then by ER-SIG-N, and then by the data payload.

C. WWiSE as Prior Art

Patent Owner argues that WWiSE has not been shown to be publicly available, and consequently, has not been shown to be prior art. Prelim. Resp. 3–11. We address the parties' arguments below concerning this issue.

Petitioner, through testimony of Dr. Lansford, asserts the following facts supporting public availability of WWiSE. WWiSE "was available and accessible to the public on July 9, 2005." Pet. 2 (citing Ex. 1007 ¶ 24). On that date, WWiSE was received by Task Group n ("TGn") of the IEEE 802.11 WLAN Working Group via a submission made to its Wireless World website, "http://wirelessworld.com." *Id.* (citing Ex. 1007 ¶¶ 15–16; Ex. 1038, 35–37; Ex. 1039, 5). According to Petitioner, via that website, WWiSE was accessible to the public by viewing the "Working Group Document Listing" and downloading the document. *Id.* (citing Ex. 1038, 25–30, 35; Ex. 1007 ¶ 18). Petitioner argues that until mid-2007, WWiSE resided on an FTP server, "ftp.wirelessworld.com," whose address and login credentials were publicly available. *Id.* (citing Ex. 1007 ¶ 19).

Subsequently, documents on that FTP server were added to IEEE's current website, "Mentor," according to Petitioner. *Id.* at 3 (citing Ex. 1007 ¶ 21). Petitioner argues that documents on Mentor have been freely available to members of the public, and searchable by year, task group, title, or other parameters. *Id.* (citing Ex. 1007 ¶ 22). Petitioner argues that interested members of the public would have been aware of WWiSE, and other proposals made to IEEE by the WWiSE consortium authors, "because they were frequently discussed in 2004 and 2005 in industry publications." *Id.* (citing Exs. 1021, 1027, 1035–1037).

The touchstone in determining whether a reference constitutes a printed publication is whether it was publicly accessible at the critical time. *SRI Int'l v. Internet Security Systems, Inc.*, 511 F.3d 1186, 1194 (Fed. Cir. 2008). Public accessibility exists where the reference document "has been disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art exercising reasonable diligence, can locate it." *Id.* (quoting *Bruckelmyer v. Ground Heaters, Inc.*, 445 F.3d 1374, 1378 (Fed. Cir. 2006)). Patent Owner argues that a relevant person of ordinary skill using reasonable diligence would not reasonably have located the paper residing on the TGn ftp site. Prelim. Resp. 3–4. We discern three potential avenues for public availability in the assertions set forth by Petitioner: (1) availability to the members of TGn through the Wireless World website; (2) availability to others through the ftp site; and (3) availability to others through Mentor. We address each in turn, taking into account Patent Owner's arguments.

1. Members of TGn

Patent Owner addresses public availability of WWiSE to the TGn members in a footnote, stating,

> For good reason, [Petitioner] does not argue that . . . WWiSE was presented to the TGn working group and that would have been sufficient. *See Samsung* [*Elecs. Co. v. Infobridge Pte. Ltd.*, 929 F.3d 1363, 1371–72 (Fed. Cir. 2019)] (distribution to 250-member working group of skilled artisans was insufficient); *SRI*, 511 F.3d at 1196–97 (distribution to the review committee was insufficient).

Prelim. Resp. 7 n.4. However, the *Samsung* and *SRI* cases are distinguishable on their facts.

In *Samsung*, the committee was the author of the document, and therefore distribution among the committee members was not considered

public availability because the document had not been distributed outside its authors. That is not the case here, because WWiSE was submitted to, not authored by, the TGn working group. As Patent Owner points out, WWiSE was "one of myriad submissions for the working group to debate whether to incorporate into a working draft" and it was "*not* incorporated into [the] 802.11n standard" that was eventually published by the TGn working group. Prelim. Resp. 5. Because WWiSE was "for the working group to debate," in Patent Owner's words, WWiSE was purposed for accessibility to the TGn working group, an entity that did not author WWiSE, and which comprised at least fifty contributors that were associated with a wide variety of technology companies in this space. Ex. 1006, 2–4. *Samsung* is therefore inapposite to the facts here.

In *SRI*, the court analogized the placement of a pre-publication draft awaiting peer review on an FTP server as "placing posters at an unpublicized conference with no attendees," with no record that it "was accessible to anyone other than the peer-review committee." *SRI*, 511 F.3d at 1197. Here, there is ample evidence that membership in the working group, attendance at its meetings, and access to its documents was available to the public. *See* Ex. 1007 ¶¶ 14 (meetings open to public); 15 (submissions presented at meetings and available to all participants); 18 (stating that "an interested member of the public could visit the 802wirelessworld website, click the 'become a member 'link . . . and download any submissions that had been uploaded"). Unlike *SRI*, WWiSE was not intended for a select group of people to review prior to its publication; instead, WWiSE was intended for public debate among the working group members to influence their choices for the new 802.11n standard. *See* Ex. 2001 ¶¶ 89 (WWiSE presentation in July 2005 presented

to TGn meeting), 90 ("[t]he completed 802.11n standard . . . does contain aspects from the various TGn Sync and WWiSE proposals"). *SRI* is therefore also inapposite to the facts here.

Of greater significance to the facts at hand is the court's analysis in *GoPro, Inc. v. Contour IP Holding LLC,* 908 F.3d 690 (Fed. Cir. 2018). In *GoPro*, the court stated, "our case law directs us to also consider the nature of the conference or meeting; whether there are restrictions on public disclosure of the information; expectations of confidentiality; and expectations of sharing the information." *Id.* at 694 (citing *Medtronic v. Barry*, 891 F.3d 1368, 1382 (Fed. Cir. 2018)); *see also Valve Corp. v. Ironburg Inventions Ltd*, 8 F.4th 1364, 1374 (Fed. Cir. 2021) (public accessibility indicated where "a publication's purpose is 'dialogue with the intended [public] audience'"). In *GoPro*, the court noted that the trade show at issue, "not unlike conferences . . . is directed to individuals interested in the commercial and developmental aspects of products." *GoPro*, 908 F.3d at 694. The *GoPro* court determined that, although its trade show was open only to dealers rather than the general public, the document at issue "was disseminated with no restrictions and was intended to reach the general public." *Id.* at 695.

Like *GoPro,* WWiSE was disseminated with no expectation of confidentiality, as it was available to be shared by the TGn members through unrestricted download and by sharing the publicly available ftp site location and access credentials. Ex. 1007 ¶ 19. Public disclosure was encouraged, not restricted, as evidenced by the public nature of the TGn meetings at which proposals such as WWiSE were discussed by the working group. *Id.* ¶¶ 14, 18, 19. Moreover, the WWiSE proposals were known to the public as one of two finalist proposals considered for adoption as the new standard.

Ex. 2001 ¶ 67; Ex. 2015, 311 ("As the standards war is fought across the globe at IEEE meetings," "support has coalesced around two main proposals, from groups named TGn Sync and WWiSE."). Also like *GoPro*, the relevant audience was involved in the meeting because the TGn group members and attendees of the 802.11 working group meetings were engineers, researchers, and business persons interested in networking technologies, including wireless local area networking (WLAN) technologies. Ex. 1017 ¶ 14; *see also* Ex. 2015, 311 (stating that "quite a few manufacturers of electronic devices that might use 802.11 (Cisco, Nokia, Nortel, Philips, Samsung, Sanyo, Sony, and Toshiba) have also become part of the effort").

Based on the above facts, we determine that Petitioner has sufficiently shown, for purposes of institution, that WWiSE, at the critical time, was disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art exercising reasonable diligence, could have located it. We note that a document "need not be easily searchable after publication if it was sufficiently disseminated at the time of its publication." *Medtronic*, 891 F.3d at 1381. Consequently, we determine that Petitioner has shown public availability of WWiSE based upon the availability of WWiSE among the TGn members.

We further disagree with Patent Owner's assumption that Petitioner did not sufficiently assert public availability based upon the presentation of WWiSE to the TGn working group. Petitioner asserted that WWiSE was publicly available on the date that it was submitted to that working group, and then provided facts to establish that the public may join that working group and download submissions such as the WWiSE submission. Our consideration of public availability is necessarily based upon all of the

relevant facts presented. *See SRI*, 511 F.3d at 1198 ("[T]his court vacates and remands for a more thorough determination of the [public] accessibility . . . based on additional evidence.").

Thus, we determine that dissemination to the working group provided sufficient public availability to support Petitioner's assertion that WWiSE is prior art. For purposes of informing further briefing, we also address public availability based on access to the ftp and Mentor storage of WWiSE.

2. FTP

Patent Owner argues that a relevant person of ordinary skill using reasonable diligence would not reasonably have located the paper residing on the TGn ftp site. Prelim. Resp. 3–4. First, Patent Owner argues that a person of ordinary skill in the art "exercising reasonable diligence in seeking information regarding extending the range of a header field in a system such as Hansen's" would not have visited the ftp site on which WWiSE was stored upon submission to TGn. Prelim. Resp. 6.

The facts on the current record do not support Patent Owner's argument. With regard to whether one seeking to extend the range of a header field in a system such as Hansen's would have visited TGn's site, the record reflects significant public discussion of WWiSE proposals. A book submitted by Patent Owner titled, "802.11 Wireless Networks, The Definitive Guide," contains significant discussion of a WWiSE proposal, including its header fields, and states that "some horse trading will likely result in a few WWiSE features being incorporated," although "the proposals themselves may have changed quite a bit since the drafts upon which this chapter was based were written." Ex. 2015, 312, 314–323. Dr. Haas testifies that "proposals from TGn Sync and WWiSE (short for 'World-Wide Spectrum Efficiency') emerged as leading candidates."

Ex. 2001 ¶ 67. Thus, the record reflects significant public awareness of WWiSE proposals in the IEEE 802.11n community.

Dr. Haas further states that Hansen "places the context of its disclosure into the TGn working group" and explains that a number of proposals had emerged, including from TGn Sync, to which Hansen desired the addition of greenfield access as its primary goal. *Id.* ¶ 91; *see* Ex. 1005 ¶ 33. Hansen also refers to proposals from WWiSE, for which Hansen relies for greenfield access teachings. Ex. 1005 ¶¶ 33, 77. Hansen specifically points to a WWiSE proposal as the source of its desired header field. *Id.* ¶ 79. Thus, Hansen itself guides its readers to WWiSE proposals as relevant information to WLAN header fields.

A reader would have been guided to the ftp site on which such proposals were publicly available. The address of the ftp site was publicly available; for example, it was referenced in both U.S. Patent 7,415,074 and a paper published in ACM SIGCOMM Computer Communication Review. Ex. 1007 ¶ 19. The former document addresses MIMO use in IEEE 802.11n, and the latter addresses TGn itself; both of which address features relevant to those considered by Hansen, and could have led the person of ordinary skill in the art to the TGn ftp site. *Id.*, Appendix C, 1:20–26; Appendix D, 6. The ftp site's login credentials were obtainable through a free account. *Id.*

Thus, discussion of WWiSE in the 802.11n community and in Hansen would have led a person of skill in the relevant art seeking information on header fields for greenfield access directly to "a WWiSE proposal" made to the TGn working group, and consequently, to its ftp site on which WWiSE proposals were stored. In view of the current record evidence, we do not

agree that a person of ordinary skill in the art would not have been led to TGn's ftp site to seek information on proposals submitted by WWiSE.

Once at TGn's website, a person having ordinary skill in the art would need to be able to locate WWiSE proposals exercising reasonable diligence. Patent Owner argues that a reasonable person of skill in the art would not have "played archeologist with [Petitioner]'s alleged sites, painstakingly combing through thousands upon thousands of submissions of dubious relevancy, manually reading rejected submissions and proposals in search of a portion of an extended-range feature omitted from the draft and final 802.11n standard." Prelim. Resp. 5–6. Dr. Haas testifies that ftp sites "generally allow a user to see and navigate a directory structure, as well as upload or download files, depending on permissions. They are not used like websites where information is posted in a form immediately loaded by a web browser." Ex. 2001, 54 n.4.

An ftp structure itself does not necessarily present an impenetrable barrier to locating a document stored thereon. Addressing a similar situation, the Federal Circuit indicated that a hierarchical organization in which the name of the hierarchical levels indicated its topics, permitted a document to be found "easily." *Suffolk Technol., LLC v. AOL, Inc.*, 752 F.3d 1358, 1365 (Fed. Cir. 2018) ("Suffolk overstates the difficulty in locating the Post after publication. Usenet newsgroups were organized in a hierarchical manner, as evidenced by the name of the newsgroup at issue—comp.infosystems.www.authoring.cgi. Thus, someone interested in CGI could easily locate a list of posts in this newsgroup."). Further, in *SRI*, the court stated that "the FTP server directory structure (/pub/emerald/) of a well-known institution in the intrusion detection community and the

acronym of 'ndss98.ps' might have hinted at the path to" the document at issue. *SRI*, 511 F.3d at 1197.

However, the current record does not indicate how a non-member, accessing the ftp site with provided information and in search of WWiSE proposals, could have located WWiSE using reasonable efforts. The record does not indicate any naming conventions in the ftp structure that would facilitate such a search. Dr. Lansford merely states that a person "could view the 'Working Group Document Listing' and download any submissions that had been uploaded." Ex. 1007 ¶ 18. Neither Dr. Lansford nor the "New Participant Orientation" document on which he relies explain whether the document name in the ftp system would indicate that it is a WWiSE proposal; at best, the document name is shown to contain the year and working group. Ex. 1007, Appx A, 10. On the contrary, the depiction of the directory structure shown in the "New Participant Orientation" document shows top-level directories under 802.11 of "archive," "drafts," "INCOMING-Pre-03-500-Documents-Only," "pre-meeting," and "work." *Id.*, Appx A, 38. None of these directories appear, on their face, to guide a user towards finding submissions by WWiSE.

Patent Owner further argues that WWiSE was "merely one of many thousands of submissions to one of many dozens of working groups addressing the 802.11 standard." Prelim. Resp. 3–4. However, "even relatively obscure documents qualify as prior art so long as the relevant public has a means of accessing them." *GoPro*, 908 F.3d at 693 (Fed. Cir. 2018); *see also Valve*, 8 F.4th at 1376 (stating, "if an examiner," "through a 'brief . . . search,'" "could access the article before the priority date, so could the general public"). Thus, the presence of other documents does not impede the availability of WWiSE so long as the relevant audience could

locate it. However, we take the number of documents under consideration in the absence of any other indexing or locating feature. Patent Owner indicates that the TGn working group received approximately 4,600 submissions before the relevant date in 2009. Prelim. Resp. 4 (citing Ex. 2005). Here, the large number of submissions weighs against the ability of a person to locate a document in a generically-name server directory and having an unknown name.

Patent Owner also argues that "there is no evidence that anyone outside the working group regularly visited the alleged sites and accessed July 2005 WWiSE." Prelim. Resp. 5. However, a showing of actual retrieval is not required for public accessibility. *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1569 (Fed. Cir. 1988) ("Accessibility goes to the issue of whether interested members of the relevant public could obtain the information if they wanted to. If accessibility is proved, there is no requirement to show that particular members of the public actually received the information."). In the absence of any other indexing or locating feature, such evidence of retrieval could support public accessibility. *Massachusetts Institute of Technology v. AB Fortia*, 774 F.2d 1104, 1108–09 (Fed. Cir. 1985). However, no such evidence exists on the current record.

At this stage, and on the current record, Petitioner has not shown that a person having ordinary skill in the art, guided by discussion in the pertinent art and in Hansen to seek WWiSE documents submitted to the 802.11 working group, could have located WWiSE using reasonable efforts on the ftp site.

3. Mentor

Patent Owner argues that a relevant person of ordinary skill using reasonable diligence would not reasonably have located the paper residing

on the Mentor website. Prelim. Resp. 3–4. First, Patent Owner argues that "there is no evidence that Mentor was searchable at the relevant time, other than Dr. Lansford's conclusory (and thus insufficient) statement that it was." Patent Owner points out that although Dr. Lansford "states that he previously downloaded files . . . he never testified that he performed a search of any type at the relevant time." *Id.* at 7 (citing Ex. 1007 ¶¶ 21–22).

Because we find public accessibility through dissemination of WWiSE to the working group members, we need not determine this issue for purposes of institution. We note, however, that Dr. Lansford stated that all documents were uploaded to Mentor shortly after its creation, and that he personally used the website between 2007 and 2009, and that he regularly accessed documents through Mentor during that time. Ex. 1007 ¶¶ 21–22. Dr. Lansford also indicates that he has a long history of experience with IEEE 802.11 WLAN Working group, as a member and through his employment at various companies and as a lecturer in that field. *Id.* ¶¶ 5–10. Nevertheless, at this stage, Dr. Lansford's testimony does not directly support Petitioner's assertion that "[e]ntries in Mentor *were and* remain searchable." Pet. 3 (citing Ex. 1007 ¶ 22) (emphasis added) .

Patent Owner further argues that Mentor was not searchable by subject matter, but only by fields such as year, working group, document control number, title, and author/affiliation. Prelim. Resp. 7–8 (citing Ex. 2007; Ex. 1007 ¶ 21). Patent Owner argues that even if Mentor was searchable at the critical time, the available search parameters were insufficient for public accessibility because they lack the ability to search the text of the documents or their subject matter. *Id.* at 8–9. Patent Owner argues that although Mentor may be searched by the term "WWiSE," that term does not indicate that it contains extended range teachings, and would

result in over 70 documents. *Id.* at 10 (citing Ex. 1007, Appx K). Patent Owner argues that a reasonably diligent person of ordinary skill in the art would not have combed through those 70 results searching for extended range techniques, particularly because neither Hansen nor the adopted 802.11n standard included such techniques as proposed by Intel. *Id.*

Petitioner's assertions, however, rely upon guidance to a person seeking to extend the range of the 802.11 standard in the form of Hansen and discussion in industry publications, that proposals by the WWiSE group addressed improvements to 802.11n, such that the final WWiSE proposal was one of two remaining proposals for selection as the baseline for the new standard. Pet. 3; Ex. 1036, 1. The record includes a contemporaneous article indicating that at least one WWiSE proposal to be considered by TGn contained range extension features. Ex. 1036, 1 ("Enhancements that improve robustness and range," "Advanced forward-error-correction coding option to facilitate maximum coverage and range," "Provisions for advanced features that improve data rate and range"). The record also indicates that the book "801.11 Wireless Networks, The Definitive Guide" discussed WWiSE's use of duplicate Signal-N fields to retain backwards compatibility in a mixed mode with older OFDM stations, which was a focus of Hansen. Ex. 2015, 323; Ex. 1005 ¶ 33. Further, a person searching for WWiSE on the Mentor website, based upon this guidance, would have located the WWiSE document as part of the 70 results for that search. Ex. 1007, Appx. K. For purposes of informing the parties for further briefing, the record supports Petitioner's assertion that the relevance of WWiSE proposals through Hansen and industry publications would have guided a person seeking to improve features of 802.11n, including range extension, to look to those WWiSE proposals.

D. Challenged Claim 1

1. Storage Media (Preamble)

Petitioner argues that Hansen teaches "[a] non-transitory computer-readable information storage media, having stored thereon instructions, that when executed by one or more processors in a transceiver, cause to be performed a method," as recited in the preamble of claim 1. Pet. 27–31. More specifically, Petitioner argues that "Hansen discloses '**a transceiver** comprising a transmitter and a receiver in a MIMO system' that transmits and receives RF signals via an antenna." *Id.* at 27 (citing Ex. 1005 ¶¶ 15, 49–50, Fig. 2b). In addition, Petitioner argues that Hansen teaches that "its 'invention' may 'be embedded in a computer program product, which comprises all the features enabling the implementation of the methods described [in Hansen], and which when loaded in a computer system is able to carry out these methods.'" *Id.* at 28 (quoting Ex. 1005 ¶ 121). According to Petitioner, one of ordinary skill in the art "would have understood that Hansen is describing an embodiment in which the disclosed functionality (e.g.[], transmission and reception of its 'compromise' greenfield PPDU) is implemented in software." *Id.* (citing Ex. 1003 ¶ 100).

After reviewing Petitioner's arguments and evidence, which are not addressed by Patent Owner at this stage of the proceeding, we are persuaded that Petitioner demonstrates, for purposes of this institution decision, that Hansen teaches claim 1's preamble. In light of our finding, we need not, and thus do not, reach whether claim 1's preamble is limiting.

2. Generating a First Packet Type

Petitioner argues that the combination of Hansen and WWiSE teaches "generating, by a wireless Orthogonal Frequency Division Multiplexing (OFDM) communications transmitter, a first packet type comprising a first

header field," as recited in claim 1. Pet. 31–33. More specifically, Petitioner argues that Hansen teaches a first packet having a first header, in the form of a PPDU, having preamble 302, header 304, and data 306. *Id.* at 31 (citing Ex. 1005 ¶ 59; Ex. 1003 ¶ 109 ("A packet is usually formed by a preamble, header, and payload"). In addition, Petitioner argues that "WWiSE similarly describes a PPDU as having a preamble, header, and data." *Id.* (citing Ex. 1006, 58:17–60:4). According to Petitioner, the combination of Hansen and WWiSE teaches a Normal Range ("NR") greenfield PPDU (i.e., "a first packet type"). *Id.* at 32 (citing Ex. 1003 ¶ 110).

After reviewing Petitioner's arguments and evidence, which are not addressed by Patent Owner at this stage of the proceeding, we are persuaded that Petitioner demonstrates, for purposes of this institution decision, that the combination of Hansen and WWiSE teaches this limitation.

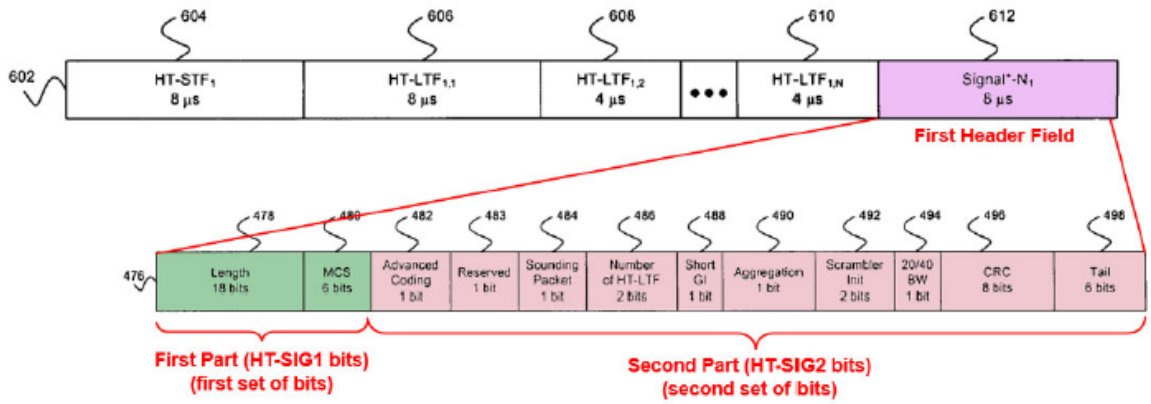
3. First Header Field Comprises Two Parts

Petitioner argues that the combination of Hansen and WWiSE teaches "wherein the first header field comprises two parts, a first part comprising a first set of header bits of the first header field and a second part comprising a second set of header bits of the first header field, wherein the first set of header bits of the first header field is different than the second set of header bits of the first header field," as recited in claim 1. Pet. 33–36. More specifically, Petitioner argues that Hansen's first header has a first header field, "Signal*-N." Pet. 33 (citing Ex. 1005 ¶¶ 20, 67, 97, Fig. 6a).[8]

[8] Petitioner also refers to Ex. 1012 for description of the Signal*-N field; however, because Ex. 1012 is not part of the asserted references for the asserted grounds, we do not consider its teachings except as support for Dr. LaPorta's testimony in his declaration.

Petitioner argues that the Signal*-N field comprises 48 total bits corresponding to two transmitted OFDM symbols. *Id.* at 34 (citing Ex. 1005 ¶¶ 62, 67–68, 97). Petitioner argues that the first header field includes a first part comprising an 18-bit length field 478 and a 6-bit MCS field 480, collectively referring to those as "HT-SIG1 bits." *Id.* at 35 (citing Ex. 1005 ¶¶ 67–68; Ex. 1003 ¶ 117). Petitioner argues that the first header field also includes a second part comprising 24 bits, collectively referring to those as "HT-SIG2 bits." *Id.* (citing Ex. 1005 ¶¶ 67–68; Ex. 1003 ¶ 118) (pointing to Hansen's 1-bit advanced coding field 482, 1-bit reserved field 483, 1-bit sounding packet field 484, 2-bit number of HT-LTF field 486, 1-bit short GI field 488, 1-bit aggregation field 490, 2-bit scrambler initialization field 492, 1-bit 20 MHz or 40 MHz bandwidth field 494, 8-bit cyclical redundancy check field 496, and 6-bit tail field 498).

Petitioner provides an annotated illustration of the first header field shown in Hansen's Figure 6a and 4c (Pet. 34), which we reproduce below:



Excerpt of Hansen, Figure 6a (top); Figure 4c (bottom)

Annotated Figure 4c illustrates the above-described fields, with green highlighting of the first two fields (478 and 480) and pink highlighting of the remaining fields (482–484, 486, 488, 490, 492, 494, 496, and 498). Figure 4c is illustrated as an expanded view of the Signal*-N field of Figure 6a,

which also includes HT-STF field 604 and HT-LTF fields 606, 608, and 610.

After reviewing Petitioner's arguments and evidence, which are not addressed by Patent Owner at this stage of the proceeding, we are persuaded that Petitioner demonstrates, for purposes of this institution decision, that the combination of Hansen and WWiSE teaches this limitation.

4. Generating OFDM Symbols for First Header Field

Petitioner argues that the combination of Hansen and WWiSE teaches "generating, by an encoder and a modulator, a first OFDM symbol followed by a second OFDM symbol, wherein the first OFDM symbol is used to transmit the first part of the first header field and the second OFDM symbol is used to transmit the second part of the first header field," as recited in claim 1. Pet. 39–46. More specifically, Petitioner argues that the claimed encoder is taught by Hansen's coding block 202 that applies a forward error correction technique, or alternatively, coding block 202 in combination with puncture block 204, interleaving block 206, and mapping block 208. *Id.* at 43–44 (citing Ex. 1005 ¶¶ 44–46, Fig. 2b; Ex. 1003 ¶¶136–137, 144).

In addition, Petitioner argues that Hansen teaches that the output of its mapping block 208 is provided to IFFT 210, which implements OFDM, in which each signal is modulated by a carrier frequency, and generates a composite OFDM signal that corresponds to an OFDM signal. *Id.* at 45–46 (citing Ex. 1005 ¶ 48; Ex. 1003 ¶ 147). In this manner, Petitioner asserts that Hansen's IFFT 210 teaches the claimed modulator and the generation of first and second OFDM symbols. *Id.* at 46 (citing Ex. 1003 ¶¶ 147–151).

After reviewing Petitioner's arguments and evidence, which are not addressed by Patent Owner at this stage of the proceeding, we are persuaded

that Petitioner demonstrates, for purposes of this institution decision, that the combination of Hansen and WWiSE teaches this limitation.

5. Transmitting the First Packet Type

Petitioner argues that the combination of Hansen and WWiSE teaches "transmitting, by the wireless OFDM communications transmitter, the first packet type over a wireless communication channel," as recited in claim 1. Pet. 58–63. More specifically, Petitioner argues that Hansen teaches a transmitter having an antenna that is operable to transmit the PPDU wirelessly via an analog RF signal. Pet. 60–62 (citing Ex. 1005 ¶¶ 15, 31, 49. Fig. 2b; Ex. 1003 ¶ 180); *see also supra* Section VI.D.2 (finding Hansen teaches the first packet type).

After reviewing Petitioner's arguments and evidence, which are not addressed by Patent Owner at this stage of the proceeding, we are persuaded that Petitioner demonstrates, for purposes of this institution decision, that the combination of Hansen and WWiSE teaches this limitation.

6. Generating a Second Packet Type

Petitioner argues that the combination of Hansen and WWiSE teaches "generating, by the wireless OFDM communications transmitter, a second packet type comprising a second header field," as recited in claim 1. Pet. 58–63. More specifically, Petitioner argues that WWiSE teaches an ER greenfield PPDU, comprising a second header field, Long Signal*-N; Petitioner combines Hansen's and WWiSE's teachings for the claimed second packet type. Pet. 60 (citing Ex. 1003 ¶ 179); *see also id.* (citing Ex. 1006, 61:37–39) (arguing that "WWiSE explains that the[] OFDM symbols [associated with the header and data fields] are appended one after another and the preamble added to form a complete PPDU ('*packet*')"); *infra* Sections VI.D.7, 12 (addressing the asserted parts of the claimed second

packet type, and the rationale for combining Hansen and WWiSE). Petitioner argues that WWiSE teaches that an ER capable device is one in which extended range is supported in addition to normal range MCS. *Id.* at 59 (citing Ex. 1006, 50:9–10). Petitioner adds that WWiSE's Signal*-N field "indicates whether an ER capable device is operating in the ER or NR mode." *Id.* (citing Ex. 1006, 69:29–31, 70:6–7, 50:9–13).

In addition, Petitioner argues that the second packet type "is provided to the 'plurality of digital (D) to analog (A) conversion and antenna front end blocks 214[*a*], . . . , 214[*n*]," and that "the digital signal representation is "converted to an analog RF signal that may be amplified and **transmitted via an antenna**." *Id.* at 60–61 (quoting Ex. 1005 ¶ 49; citing *id.* at Fig. 2b) (third alteration in original). According to Petitioner, "[t]he components in the transceiver after Hansen's IFFT blocks (e.g., the one or more DAC/Antenna Front Ends) that generate and transmit the complete PPDU are the recited '*wireless OFDM communications transmitter*.'" *Id.* at 61 (citing Ex. 1003 ¶ 180). Petitioner adds that "Hansen's D to A conversion and antenna front end block(s) utilize an antenna 'to transmit one RF signal via **an RF channel**.'" *Id.* at 62 (quoting Ex. 1005 ¶ 49; citing *id.* ¶¶ 15, 31) (alteration in original).

After reviewing Petitioner's arguments and evidence, which are not addressed by Patent Owner at this stage of the proceeding, we are persuaded that Petitioner demonstrates, for purposes of this institution decision, that the combination of Hansen and WWiSE teaches this limitation.

7. Second Header Field Comprises Four Parts

Petitioner argues that the combination of Hansen and WWiSE teaches "wherein the second header field comprises four parts, a first part comprising a first set of header bits of the second header field, a second part

comprising a second set of header bits of the second header field, a third part comprising a third set of header bits of the second header field and a fourth part comprising a fourth set of header bits of the second header field," as recited in claim 1. Pet. 36–39. More specifically, Petitioner argues that the second header field is taught by the Long Signal*-N of WWiSE, which repeats each part of Hansen's Signal*-N; i.e., HT-SIG1 and HT-SIG2. Pet. 36 (citing Ex. 1006, 69:16–18 ("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.")). Petitioner argues that such repetition of Hansen's Signal*-N "results in a four-part header having two HT-SIG1 parts (HT-SIG1/ER-HT-SIG1) and two HT-SIG2 parts (HT-SIG2/ER-HT-SIG2)." *Id.* at 37 (citing Ex. 1003 ¶ 124).

After reviewing Petitioner's arguments and evidence, which are not addressed by Patent Owner at this stage of the proceeding, we are persuaded that Petitioner demonstrates, for purposes of this institution decision, that the combination of Hansen and WWiSE teaches this limitation.

8. Same Sets of Header Bits

Petitioner argues that the combination of Hansen and WWiSE teaches "wherein the first set of header bits of the second header field is the same as the second set of header bits of the second header field, wherein the third set of header bits of the second header field is the same as the fourth set of header bits of the second header field," as recited in claim 1. Pet. 38–39. More specifically, Petitioner argues that prior to coding and modulation, the first HT-SIG1 part of Long Signal*-N (i.e., first set of header bits of the second header field) and the repeated HT-SIG1 part (i.e., ER-HT-SIG1) of Long Signal*-N (i.e., second set of header bits of the second header field)

include the same fields. *Id.* at 38 (citing Ex. 1005 ¶¶ 67–68; Ex. 1006, 67:1–69:3, 69:16–18, Figs. 7, 9, 11, 13, 15; Ex. 1003 ¶ 125–126).

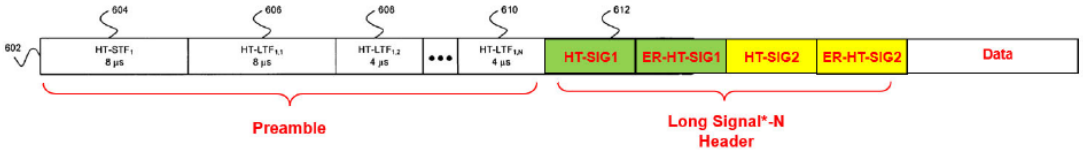
Similarly, Petitioner argues that prior to coding and modulation, the first HT-SIG2 part of Long Signal*-N (i.e., third set of header bits of the second header field) and the repeated HT-SIG2 part (i.e., ER-HT-SIG2) of Long Signal*-N (i.e., fourth set of header bits of the second header field) include the same fields. *Id.* at 38–39 (citing Ex. 1005 ¶¶ 67–68; Ex. 1006, 67:1–69:3, 69:16–18; Ex. 1003 ¶ 127–128).

After reviewing Petitioner's arguments and evidence, which are not addressed by Patent Owner at this stage of the proceeding, we are persuaded that Petitioner demonstrates, for purposes of this institution decision, that the combination of Hansen and WWiSE teaches this limitation.

9. Generating OFDM Symbols for Second Header Field

Petitioner argues that the combination of Hansen and WWiSE teaches "generating, by the encoder and the modulator, a first OFDM symbol followed by a second OFDM symbol followed by a third OFDM symbol followed by a fourth OFDM symbol, wherein the first OFDM symbol is used to transmit the first part of the second header field, the second OFDM symbol is used to transmit the second part of the second header field, the third OFDM symbol is used to transmit the third part of the second header field, the fourth OFDM symbol is used to transmit the fourth part of the second header field," as recited in claim 1. Pet. 41–46, 51–58.

Petitioner argues that the claimed ordering of OFDM symbol generation, although not explicitly taught by either Hansen nor WWiSE, would have been obvious to one having ordinary skill in the art. *Id.* at 52–53 (citing Ex. 1003 ¶¶ 165–174). Petitioner illustrates the claimed transmission ordering being taught by the Hansen and WWiSE as follows:



ER Greenfield PPDU

Id. at 53. Petitioner's illustration shows its assertion of an ER Greenfield PPDU, having a preamble, header, and data, in which the second header is a Long Signal*-N header comprising, from left to right, HT-SIG1, ER-HT-SIG1, HT-SIG2, and ER-HT-SIG2. *Id.* Petitioner asserts that each corresponds to an OFDM signal. *Id.* at 47, 52–53.

Petitioner argues that such ordering would have been obvious to try because, assuming that HT-SIG1 is transmitted first, only two alternatives for such ordering exist. *Id.* at 53. Petitioner identifies such alternatives as (1) HT-SIG1, ER-HT-SIG1, HT-SIG2, ER-HT-SIG2 and (2) HT-SIG1, HT-SIG2, ER-HT-SIG1, and ER-HT-SIG2. *Id.* (citing Ex. 1003 ¶ 165). Petitioner argues that each alternative must start with HT-SIG1, pointing to such initial ordering in WWiSE, and citing this as a requirement of a TGn Sync proposal discussed in Hansen. *Id.* at 55 (citing Ex. 1006, Fig. 7, 69:16–18; Ex. 1012, 133:9–10), 12 (citing Ex. 1005 ¶¶ 61–76; Ex. 1003 ¶ 69).

Petitioner further argues that WWiSE teaches placing a repeated symbol immediately after the original symbol. *Id.* at 51 (citing Ex. 1006, 69:16–18 ("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.")). Petitioner argues that in view of the guidance from WWiSE, TGn Sync, and the limited number of possible orders of the

symbols, a person having ordinary skill in the art would have found it obvious to use the HT-SIG1, ER-HT-SIG1, HT-SIG2, ER-HT-SIG2, thereby arriving at the claimed ordering. *Id.* at 53–55.

Patent Owner argues that WWiSE only teaches adding a second identical header following the first, which would keep HT-SIG1 in its original order. Prelim. Resp. 40–41 (citing Ex. 2001 ¶ 131). Patent Owner argues that Petitioner's asserted ordering requires breaking the HT-SIG field apart and duplicating the separate symbols rather than WWiSE's description of duplicating the SIG-N field in its entirety as the ER-SIG-N field. Patent Owner further argues that even if TGn Sync were applicable, applying its teachings would "still result in HT[-]SIG1 being transmitted first." *Id.* at 41 (citing Ex. 2001 ¶ 131).

We find Petitioner's showing sufficient for institution. Petitioner asserts a combination of Hansen, which splits its Signal*-N field into two symbols, with WWiSE, which appends a second copy of a Signal-N field as an ER-Signal-N field. Ex. 1005 ¶ 97; Ex. 1006, Fig. 11, 69:13–18. WWiSE describes that the Signal-N-containing symbol is followed by the ER-Signal-N containing symbol, which supports Petitioner's assertion that the combination would start with the first bits of the Signal-N header, which Petitioner labels HT-Sig-1. Ex. 1006, 69:16–18; Pet. 53.[9] Because Hansen's Signal-N header bits are split between two symbols, we do not

[9] Petitioner's assertions here are based not on Dr. LaPorta's testimony for which Ex. 1012 is used to support its statements, but on Ex. 1012 itself. We do not rely upon Ex. 1012 for its teachings here because at this stage Petitioner has not (1) shown that it is publicly available prior art, (2) listed it as a reference in the combination, or (3) shown that it is the document being relied upon in Hansen.

agree with Patent Owner at this stage that there is no reason to split the Signal-N symbol into two symbols in the Hansen-WWiSE combination.

We determine that Petitioner has sufficiently shown, for purposes of institution, that a person having ordinary skill in the art would have found it obvious to try generating and sending two identical symbols followed by the other two identical symbols when combining Hansen and WWiSE. The application of common sense to try a limited number of known options within the technical grasp of a person of ordinary skill may indicate the obviousness of a combination. *KSR*, 550 U.S. at 421. When applying WWiSE's teaching that ER-containing symbols follow non-ER symbols to Hansen's two-symbol, non-ER Signal-N, we are persuaded by Dr. LaPorta's testimony that a person of ordinary skill in the art would have anticipated success with either alternative 1 (NR symbol followed by same-bit ER symbol) or alternative 2 (both NR symbols followed by both ER symbols). Ex. 1003 ¶¶ 166–168.

Moreover, we do not find the presence of the REXT bit in the third symbol to show that the combination would be inoperative. Patent Owner argues that the receiver in Petitioner's combination would not know if it was receiving NR or ER, and would therefore not be able to properly receive the PPDUs. Prelim. Resp. 40. However, Patent Owner does not assert that the REXT bit does not work for its intended purpose in WWiSE. Petitioner's placement of the REXT bit in Hansen (26th of 48 bits) is not dissimilar to its placement (the 37th out of 54 bits) in WWiSE. Ex. 1006, 69, 29–31, Table 11, Fig. 17; Pet. 35 (citing Ex. 1005 ¶ 67 (reserved field 483)). Because the evidence of record indicates that received symbols may be buffered prior to decoding, and that a REXT bit within a symbol may be used to indicate that a duplicate ER header has been generated, the current record sufficiently

supports Petitioner's assertion that WWiSE's REXT bit information header field may operably be combined with Hansen's reserved header field.

In sum, we are persuaded that Petitioner demonstrates, for purposes of this institution decision, that the combination of Hansen and WWiSE teaches this limitation.

10. Bits in Different Order

Petitioner argues that the combination of Hansen and WWiSE teaches "wherein the second set of header bits of the second header field transmitted using the second OFDM symbol are transmitted in a different order than the first set of header bits of the second header field transmitted using the first OFDM symbol," as recited in claim 1. Pet. 63–65. Petitioner also argues that the combination of Hansen and WWiSE teaches "wherein the fourth set of header bits of the second header field transmitted using the fourth OFDM symbol are transmitted in a different order than the third set of header bits of the second header field transmitted using the third OFDM symbol," as recited in claim 1, for the same reasons. *Id.*

More specifically, Petitioner argues that WWiSE describes OFDM subcarrier frequency premutation and explains that the "frequency domain MIMO-OFDM symbol ER-SIG-N is derived from MIMO-OFDM symbol SIG-N by applying [a] permutation on the subcarrier indices . . . of the OFDM data symbols composing SIG-N." *Id.* at 64 (citing Ex. 1006, 69); *see also* Ex. 1006, 69 (changing order of subcarrier indices for ER-SIG-N from SIG-N). Dr. LaPorta testifies that a person having ordinary skill in the art "would have understood that . . . WWiSE's frequency permutation would be accomplished by changing the order of the bits fed into the IFFT for the repeated ER-SIG-N, so that the modulation order is changed." Ex. 1003 ¶ 186. Dr. LaPorta states that this is accomplished in WWiSE by bit

interleaving, which is the same method asserted by Patent Owner in its infringement contentions that was used to reorder bits. *Id.* ¶ 188 (citing Ex. 1032, 45).

After reviewing Petitioner's arguments and evidence, which are not addressed by Patent Owner at this stage of the proceeding, we are persuaded that Petitioner demonstrates, for purposes of this institution decision, that the combination of Hansen and WWiSE teaches this limitation.

11. Transmitting the Second Packet Type

Petitioner argues that the combination of Hansen and WWiSE teaches "transmitting, by the wireless OFDM communications transmitter, the second packet type over the wireless communication channel," as recited in claim 1. Pet. 58–63. More specifically, Petitioner argues that Hansen teaches a transmitter having an antenna that is operable to transmit the PPDU wirelessly via an analog RF signal. *Id.* at 61–62 (citing Ex. 1005 ¶¶ 15, 31, 49. Fig. 2b; Ex. 1003 ¶ 180); *see also supra* Section VI.D.6 (finding Hansen teaches the second packet type).

After reviewing Petitioner's arguments and evidence, which are not addressed by Patent Owner at this stage of the proceeding, we are persuaded that Petitioner demonstrates, for purposes of this institution decision, that the combination of Hansen and WWiSE teaches this limitation.

12. Combining Hansen and WWiSE

Petitioner argues that a person having ordinary skill in the art would have five reasons to make such a combination. Pet. 21 (citing Ex. 1003 ¶ 91). First, Petitioner argues that Hansen "repeatedly suggests the combination." *Id.* Because Hansen suggests combining aspects of proposals by the WWiSE and TGn Sync industry teams, Dr. LaPorta testifies that a person having ordinary skill in the art would have been motivated to

combine aspects of WWiSE (which issued after Hansen's filing date) into Hansen's greenfield PPDU. *Id.* (citing Ex. 1003 ¶¶ 91–92; Ex. 1006, 1, 31, 46–48, 50, 67–70). Petitioner points to documents purportedly expressing a "critical need to merge these two competing proposals to reach a final version of the 801.11n standard." *Id.* (citing Ex. 1027, 1; Ex. 1028, 1; Ex. 1021, 1).

Patent Owner argues, and we agree at this stage, that a general desire to combine two competing proposals as expressed in Hansen does not specifically motivate incorporating ER header bits into the standard, as asserted by Petitioner. Prelim. Resp. 45–47. Although insufficient by itself to support the asserted combination, such an expressed desire to combine proposals provides some impetus to consider features from each proposal as a compromise to create the new IEEE standard, and we consider that in our consideration of Petitioner's other reasons.

Second, Petitioner argues that incorporating the ER capability of WWiSE into Hansen would provide an extended range to the device of Hansen. Pet. 22 (citing Ex. 1003 ¶ 93). Petitioner notes that WWiSE informs the reader of this benefit, stating, "[a] characteristic of ER MCS is that they have a longer range than NR MCS." *Id.* (citing Ex. 1006, 50:15). Dr. LaPorta testifies that the ER capability of WWiSE, which uses a repeated header field and frequency permutation (i.e., frequency diversity) on the duplicated version of the header field, makes the Signal*-N header field more decodable for a given signal power, improving receiver gain and allowing weaker signals to be received and decoded more effectively. Ex. 1003 ¶ 93.

Patent Owner argues that repeating bits was "one of the least efficient approaches available to [one of ordinary skill in the art] in 2009," and that it

was rejected by the TGn Working Group and never adopted into 802.11n. Prelim. Resp. 12 (citing Ex. 2001 ¶¶ 60–61, 90). Patent Owner also argues that because repeating bits was known, Hansen's choice not to use it underscored that one of ordinary skill in the art would not find it desirable to add repeated headers to Hansen. However, obviousness of the Hansen-WWiSE combination is not solely guided by the choices made in Hansen or by the TGn Working Group, but by the knowledge and choices available to a person having ordinary skill in the art. Here, Patent Owner admits that repeating bits was known, but represented a tradeoff with efficiency. Prelim. Resp. 12. Moreover, 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. 38 ("Indeed, since basic repetition was known, [one of ordinary skill in the art] would have understood that, since basic repetition was known, if additional range extension would have been desirable, Hansen could have added repeated headers.") (citing Ex. 2001 ¶ 141); *see also* Ex. 1003 ¶ 93 (Dr. LaPorta testifying that temporal diversity (i.e., repeated header field) makes the header field more decodable).

In addition, Patent Owner argues that any range advantages gained by implementing WWiSE's ER feature would be negligible because Hansen already incorporated other range-improving techniques, including beamforming and MIMO. Prelim. Resp. 31–32 (citing Ex. 2001 ¶ 76, 121–122). According to Patent Owner, beamforming improves signal-to-error ratios so as to effectively improve the range, and MIMO spatially repeats headers on multiple antennas, which also boosts range. Prelim. Resp. 32 (citing Ex. 2001 ¶¶ 61–63, 121–122; Ex. 2015, 312, 334).

However, the record does not indicate that beamforming or MIMO are incompatible with WWiSE's ER feature such that a person having ordinary skill in the art would not add an ER feature to Hansen. At best, Dr. Haas states, "WWiSE, however, did not include a specific way to do beamforming. While some articles regarding WWiSE proposals reference beamforming, they state only that provisions are included." Ex. 2001 ¶ 120. Such does not indicate any incompatibility, or tend to show that beamforming would not be used with ER. With respect to MIMO, Dr. Haas points to its use in WWiSE. *Id.* ¶121 (citing Ex. 1006, 70:18–20 ("The SIG-N MIMO-OFDM symbol is transmitted simultaneously from all TX antennas in all modes.")). The use of MIMO and ER in WWiSE supports Petitioner's contention that some added advantage would accrue from their use in combination. The current record therefore supports Petitioner's assertion that a person having ordinary skill in the art would look to the addition of WWiSE's ER to Hansen for additional range extension. Pet. 22–25 (citing Ex. 1003 ¶ 93).

Patent Owner argues that Hansen uses BPSK modulation, which "already had a longer range provision than" WWiSE, which used quadrature phase-shift keying ("QPSK") modulation. Prelim. Resp. 26–30 (citing Ex. 2001 ¶¶ 44, 54, 115–118). Thus, Patent Owner argues, "the repetition in . . . WWiSE, at best, puts it back on par with Hansen's BPSK—it does not improve it." *Id.* at 30–31 (citing Ex. 2001 ¶ 119).

However, Patent Owner indicates that WWiSE does use BPSK modulation for its ER feature, stating that the ER in WWiSE is used "only with rate-1/2 encoding using BPSK modulation." *Id.* (citing Ex. 1006, 69) (emphasis added). WWiSE appears to use QPSK with 20 MHz modes, and BPSK modulation with 40 MHz modes. Ex. 1006, 70:8–11. Thus, the

current record does not support a finding that combining WWiSE necessarily incorporates a less effective QPSK modulation that would negate any beneficial effect of WWiSE's ER feature.

Third, Petitioner argues that the range advantages would be recognized as beneficial even at the cost of some throughput reduction. Pet. 23 (citing Ex. 1003 ¶ 94). Dr. LaPorta states that such a tradeoff was familiar to a person having ordinary skill in the art. Ex. 1003 ¶ 94 (citing Ex. 1014 ¶ 80) ("repetition of the OFDM symbol and a diversity effect due to the subcarrier allocation may be achieved, the transmission speed may be reduced by half, **but a service radius may be increased to 50% to 100%**"). Petitioner asserts that such a combination would permit transmission at the highest speed achievable based on the current conditions of a channel. Pet. 23 (citing Ex. 1003 ¶ 94).

Patent Owner argues that the ER in WWiSE is about range extension for the data portions (the ER MCS) of the packets, not the header. Prelim. Resp. 34–35 (citing Ex. 2001 ¶¶ 84–85, 124, 127, 140). Patent Owner argues that Petitioner provides no reason for extension of reception of the Signal*-N field by itself. *Id.* at 39 (citing Ex. 2001 ¶¶ 123–124, 140–42).

However, it is unclear why extension of the headers would be separate from extension of the signal. Because the headers are used to decode the data, and the headers and data are transmitted in the same message, reception of the headers appears to be associated with reception of the data. Patent Owner further argues that WWiSE sets forth other features, such as that are required to grant range extension. *Id.* at 35–38 (citing Ex. 2001 ¶¶ 84–89, 124–128; Ex. 1030, 22, 24–29; Ex. 1006, 46–48, 50, 52). Patent Owner argues that these other features have not been considered by Petitioner in its asserted combination, and that those features add a

complexity to the combination that "would greatly complicate any purported combination." *Id.* at 37 (citing Ex. 2001 ¶ 129).

However, the test for obviousness is not determined by "whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference. . . . Rather, the test is what the combined teachings of [those] references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). We acknowledge the considerations raised by Patent Owner. However, on the current record, Petitioner has sufficiently shown the combined teachings of Hansen and WWiSE to have suggested modifying Hansen with the ER extended range features of WWiSE.

Because Petitioner has sufficiently provided rationale for the combination, we need not address Petitioner's remaining assertions that the combination is the application of a known technique (ER capability as per WWiSE) to a known device (Hansen's compromise greenfield PPDUs) in the same way (providing ER capability), or merely combines prior art elements according to known methods, for purposes of institution. Pet. 23–24.

With regard to reasonable expectation of success, the Petition provides:

> The results of the combination of Hansen and . . . WWiSE would have been predictable and [one of ordinary skill in the art] would have had a reasonable expectation of success in the combination. (INTEL-1003, ¶97.) Both Hansen and . . . WWiSE describe PPDUs for use in the 802.11n standard being developed by IEEE. (*See, e.g.* INTEL-1005, Figure 6a; INTEL-1006, Figure 007.) Existing 802.11 standards, which both Hansen and . . . WWiSE build upon, would have been extremely well-known to [one of ordinary skill in the art] by August 21, 2009. (INTEL-1003, ¶97.) And as discussed above, the

> combination adds fields to a message, uses a reserved field to signal that ER operation is enabled (the REXT bit), and performs a frequency permutation on a symbol. (INTEL-1003, ¶97.) Because such modifications were known and in fact commonplace when dealing with evolving communications technologies, the results of such modifications would have been predictable, and [one of ordinary skill in the art] would have been had a reasonable expectation that the combination would operate successfully. (INTEL-1003, ¶97.)

Pet. 25. This argument is reasonable and supported.

13. Summary

In summary, based on the current record, and for purposes of this institution decision, we determine that Petitioner shows a reasonable likelihood that it would prevail in showing that claim 1 would have been obvious to one of ordinary skill in the art in view of Hansen and WWiSE.

E. Challenged Claims 2, 3, 5, and 7–9

At this stage in the proceeding, Patent Owner does not address separately Petitioner's arguments and evidence as to how the combination of Hansen and WWiSE teaches the limitations of claims 2, 3, 5, and 7–9. We have reviewed Petitioner's arguments and evidence regarding these claims, and, on the current record, we find them persuasive for purposes of institution.

VII. ALLEGED OBVIOUSNESS OVER HANSEN, WWISE, AND CHOI

Petitioner argues that the combination of Hansen, WWiSE, and Choi renders claims 1–3, 5, and 7–9 obvious. Pet. 70–78. Petitioner already has demonstrated a reasonable likelihood of success in proving that at least one claim of the '272 patent would have been obvious. In order to provide guidance to the parties, however, we address the issues in dispute for this ground. *See* CTPG 6 ("If a trial is instituted, the Board generally will

provide analysis of the strengths and weaknesses of all challenges in the petition in order to provide guidance to the parties for the upcoming trial.").

A. Summary of Choi

Choi is titled "Repetition Coding for a Wireless System." Ex. 1008, code (54). Choi relates to providing extended range for wireless communication according to IEEE 802.11 by repeating each encoded value that is transmitted. *Id.* ¶¶ 2, 13. Choi describes that values may be repeated in either the frequency or time domain. *Id.* ¶¶ 13, 16. Choi describes the repetition techniques as "simpler and more efficient in many cases." *Id.* ¶ 15.

B. Disputed Issues

Petitioner argues that Choi teaches the order of symbol generation for the second packet type set forth in claim 1, if not taught by the combination of Hansen and WWiSE. Pet. 70–78. Petitioner argues that Choi teaches the use of a repetition encoder placed before the input of an interleaver designed to handle repetition coded bits. *Id.* at 71 (citing Ex. 1008 ¶ 26). Petitioner argues that repetition in Choi is performed on a symbol-by-symbol basis, "meaning that for post-coding/pre-modulation repetition, a coded block corresponding to a symbol is repeated," and subsequently, interleaved and modulated. *Id.* (quoting Ex. 1008 ¶ 18, citing Fig. 3A). Relying on Dr. LaPorta's testimony, Petitioner asserts that a person having ordinary skill in the art would have recognized the application of Choi's repetition to headers as well as data. *Id.* at 72–73 (citing Ex. 1003 ¶ 281).

Petitioner argues that the lack of details in WWiSE as to how to implement repetition of a header field in its PPDUs in the transmission portion would motivate a person having ordinary skill in the art to seek teachings of those details, as provided by Choi. *Id.* at 74–75 (citing

Ex. 1003 ¶ 282). Petitioner also points to "efficiency reasons." *Id.* at 75 (citing Ex. 1003 ¶ 282). Petitioner further points to teachings in Choi, i.e., that Choi is "applicable to 802.11 standards," that Choi suggests use of repetition coding in ER systems and for communication "in noisy environments." *Id.* (citing Ex. 1008 ¶ 2; Ex. 1003 ¶ 283). Petitioner further points to evidence of use of repetition encoders for a header field. *Id.* at 76 (citing Ex. 1003 ¶ 283; Ex. 1018, 51:1331–1358).

Patent Owner argues that Choi suffers from the same defects as Hansen and WWiSE, i.e., that no further need for range exists where Hansen includes range-boosting MIMO and beamforming, and that placement of the REXT bit in the HT-SIG2 symbol would be unworkable because a receiver would not know the correct mode. Prelim. Resp. 56–57. However, we have already considered and rejected these arguments in our analysis of the Hansen-WWiSE combination.

Patent Owner further argues that Petitioner's asserted reason for combining Choi—to add details for implementing repetition—is lacking because Dr. LaPorta describes implementing repetition as a "simple concept." Prelim. Resp. 57 (citing Ex. 1003 ¶ 168).

However, Petitioner points to Choi's particular method as providing advantages such as efficiency and operability in noisy environments, which is a common concern for WLAN systems. Pet. 75 (citing Ex. 1008 ¶ 2; Ex. 1003 ¶ 283). Even assuming that repetition coding, as a general concept, is simple, a person having ordinary skill in the art could find such advantages flowing from Choi's particular method as a reason to look to Choi and apply its particular coding method.

Consequently, we determine that Petitioner has sufficiently shown, for purposes of institution, that each element of claims 1–3, 5, and 7–9 have

been taught or suggested by the combined teachings of Hansen, WWiSE, and Choi. Further, that Petitioner has sufficiently shown, for purposes of institution, that a person having ordinary skill in the art would have reason to combine the teachings of Hansen, WWiSE, and Choi as suggested by Petitioner, and would have a reasonable expectation of success in doing so.

On the record before us, and for purposes of institution, Petitioner has sufficiently shown that claims 1–3, 5, and 7–9 would have been obvious over Hansen, WWiSE, and Choi.

VIII. CONCLUSION

For the foregoing reasons, we determine that Petitioner has demonstrated that there is a reasonable likelihood that it would prevail in proving the unpatentability of at least one of the challenged claims of the '272 patent. We thus institute an *inter partes* review of all of the challenged claims of the '272 patent on all grounds asserted in the Petition. *See* 37 C.F.R. § 42.108(a).

Any findings or conclusions in this Decision are made only for the purposes of institution and are not dispositive of any issue. We have not made a final determination with respect to the patentability of any challenged claim. Our final determination will be based on the record as fully developed during trial, including any evidence or argument timely presented by the parties under our Rules.

IX. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of the '272 patent is instituted on all of the challenged claims and all grounds asserted in the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial; the trial commences on the entry date of this Decision.

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