

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PANASONIC AUTOMOTIVE SYSTEMS CO., LTD.,
Petitioner,

v.

UNM RAINFOREST INNOVATIONS,
Patent Owner.

IPR2024-00364
Patent 8,265,096 B2

Before KRISTEN L. DROESCH, BARBARA A. PARVIS, and
CHARLES J. BOUDREAU, *Administrative Patent Judges*.

DROESCH, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. Background

Panasonic Automotive Systems Co., Ltd. (“Petitioner”)¹ filed a Petition requesting *inter partes* review of claim 8 and substitute claims 44–47, 49, and 50 of U.S. Patent No. 8,265,096 B2 (Ex. 1001, “’096 Patent”). Paper 1 (“Pet.”). Petitioner filed a Declaration of Christopher J. Hansen, Ph.D. (Ex. 1002) in support of its Petition. UNM Rainforest Innovations (“Patent Owner”)² timely filed a Preliminary Response. Paper 8 (“Prelim. Resp.”). Patent Owner filed a Declaration of Branimir Vojcic, D.Sc. (Ex. 2001) in support of its Preliminary Response.

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 with respect to at least 1 of the claims challenged in the petition.”

35 U.S.C. § 314(a) (2024).

For the reasons provided below, after considering the Petition and the Preliminary Response, we determine, based on the record before us, there is not a reasonable likelihood Petitioner would prevail in showing at least one of the challenged claims is unpatentable.

¹ Panasonic Automotive Systems Co., Ltd. asserts that it “has sole control over this Petition and is the real party in interest for this Petition.” Pet. 2.

² UNM Rainforest Innovations asserts that it “makes its appearance as Patent Owner and identifies University of New Mexico Board of Regents as a Real Party-In-Interest” to this proceeding. Paper 3, 2.

B. Related Proceedings Before the Patent Trial and Appeal Board

The parties identify the following proceedings involving the '096 Patent:

Intel Corporation v. UNM Rainforest Innovations, IPR2020-01576 (terminated via settlement prior to any decision on institution); and

*Qualcomm Incorporated and ZyXEL Communications Corporation*³ *v. UNM Rainforest Innovations*, IPR2021-00375 ("375 IPR").

Pet. 3; Prelim. Resp. 1.

Claims 1–4 and 6–8 of the '096 Patent were challenged in the '375 IPR. *See* '375 IPR Paper 1. Following institution of review, Patent Owner filed a Motion to Amend that included proposed substitute claims 44–47, 49, and 50 for claims 1–4, 6, and 7. *See* Ex. 1006 ("375 Mot. To Amend"). In the Final Written Decision entered July 15, 2022, claims 1–4, 6, and 7 were found unpatentable, claim 8 was found not unpatentable, and the Motion to Amend was granted. *See* Ex. 1007 ("375 IPR Final Written Decision"). Petitioner ZyXEL Communications Corporation filed an appeal, and Patent Owner filed a cross-appeal of the Final Written Decision. *See* '375 IPR Papers 69, 70.

On July 22, 2024, the Court of Appeals for the Federal Circuit entered a decision in the appeal, affirming the unpatentability of claims 1–4, 6, and 7; reversing the Board's determination that claim 8 is not unpatentable; and remanding to the Board to determine if collateral estoppel applies to substitute claims 44–47, 49, and 50. *ZyXEL Commc 'ns Corp. v. UNM*

³ ZyXEL Communications Corporation was joined to IPR2021-00375 based on grants of a petition for *inter partes* review and a motion for joinder filed in *ZyXEL Communications Corp. v. UNM Rainforest Innovations*, IPR2021-00734.

Rainforest Innovations, Nos. 22-2220, 22-2250, slip op. (Fed. Cir. July 22, 2024). As of the date of entry of this Decision, however, the 90-day time period for filing a petition for writ of certiorari to the Supreme Court has not lapsed. *See* 28 U.S.C. § 2101. Thus, the decision of the Court of Appeals for the Federal Circuit is not yet final.

*C. Related Proceedings Before District Courts and
Court of Appeals for the Federal Circuit*

The parties also identify the following related proceedings involving or pertinent to the '096 Patent:

UNM Rainforest Innovations v. ZyXEL Communications Corp., 6:20-cv-00522-ADA (W.D. Tex.);

UNM Rainforest Innovations v. Dell Technologies, Inc., 6:20-cv-00468 (W.D. Tex.);

UNM Rainforest Innovations v. ASUSTek Computer, Inc., 6:20-cv-00142-ADA (W.D. Tex.);

UNM Rainforest Innovations v. D-Link Corp., 6:20-cv-00143-ADA (W.D. Tex.);

UNM Rainforest Innovations v. Apple Inc., 1:20-cv-00351 (W.D. Tex.);

UNM Rainforest Innovations v. TP-Link Technologies Co., Ltd., 6:19-cv-00262 (W.D. Tex.);

UNM Rainforest Innovations v. TP-Link Technologies Co., Ltd., 6:19-cv-00428-ADA (W.D. Tex.);

UNM Rainforest Innovations v. Toyota North America Inc., 2:23-cv-00424-JRG (E.D. Tex.);

ZyXEL Communications Corp. v. UNM Rainforest Innovations, No. 23-1272 (CAFC); and

UNM Rainforest Innovations v. ZyXEL Communications Corp., No. 23-1296 (CAFC).

Pet. 2; Paper 3, 2.

D. The '096 Patent (Ex. 1001)

The '096 Patent relates to methods for constructing frame structures for orthogonal frequency-division multiple access (OFDMA) systems. *See* Ex. 1001, 1:16–19. The '096 Patent explains that its frame structures and method of constructing the structures may allow data of a legacy orthogonal frequency-division multiple access (OFDMA) system “and data of a new OFDMA system to co-exist in an OFDMA frame by changing a frame structure of the OFDMA frame.” *Id.* at 4:21–25. According to the '096 Patent, “[t]he new OFDMA system may have a larger bandwidth and support higher mobility, and may use an updated transmission technology” while also being backward compatible with the legacy OFDMA system. *Id.* at 4:25–30. Figure 6A of the '096 Patent is reproduced below:

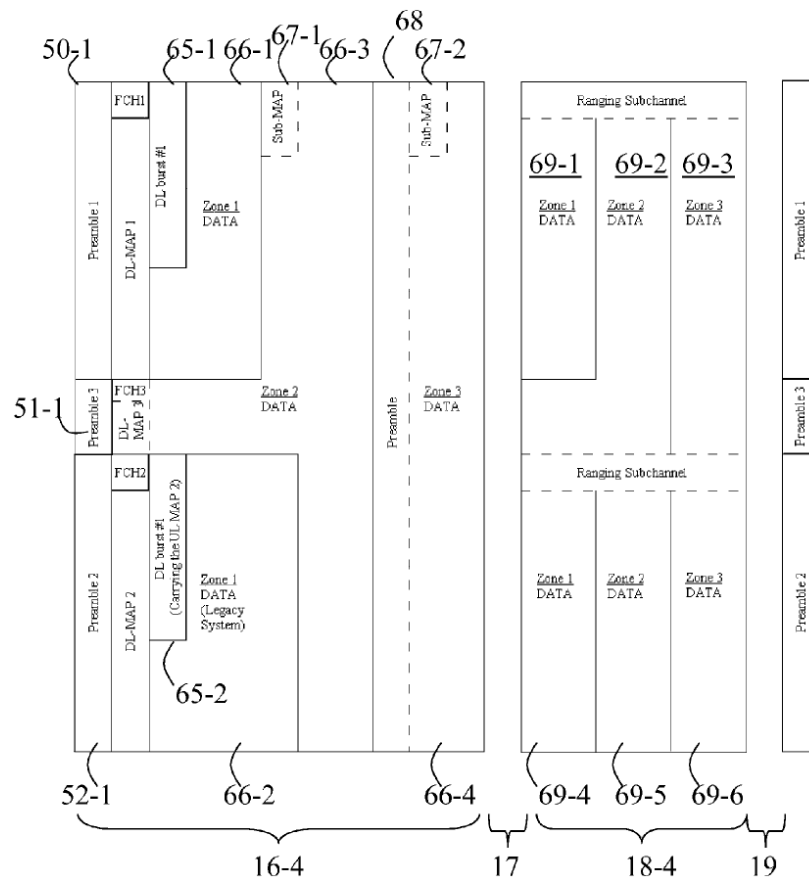


Figure 6A illustrates an OFDMA frame structure supporting high mobility and having a scalable bandwidth. *See* Ex. 1001, 4:1–3, 6:66–7:2. The frame structure includes downlink (DL) sub-frame 16-4 and uplink (UL) sub-frame 18-4. *See id.* at 7:5–7. The frame structure includes added regions related to zones 3 for high-mobility environments. *See id.* at 7:2–5. In DL sub-frame 16-4, a first added region includes preamble 68, a sub-MAP 67–2 and DATA 66-4. *See id.* at 7:5–7. In UL sub-frame 18-4, a second added region includes DATA 69-3 and 69-6 (zones 3). *See id.* at 7:7–8. DATA 66-4, 69-3, and 69-6 may be allocated for the extended OFDMA system under high mobility. *See id.* at 7:8–10. DL sub-frame 16-4 is divided according to mapping information in DL-MAP 1, DL-MAP 2, and DL-MAP 3, and UL sub-frame 18-4 is divided according to the map information in UL-MAPs in DL burst #1 65-1 and/or 65-2. *See id.* at 7:10–14. A portion of the guard band that overlaps data zones 69-1 and 69-2 in UL sub-frame 18-4 may be used to transmit data in the extended system. *See id.* at 7:14–17.

As compared to the zones in the data region of the DL sub-frame 16-4 or the UL sub-frame 18-4 of the old/legacy system or the new/extended system, the placements of the pilot symbols may be denser, the symbol periods of OFDM symbols may be shorter and the FFT sizes may be smaller in the zones 3 of the UL sub-frame 18-4 or the DL sub-frame 16-4 for the extended system under high mobility.

Id. at 7:21–27.

Figure 7 of the '096 Patent is reproduced below:

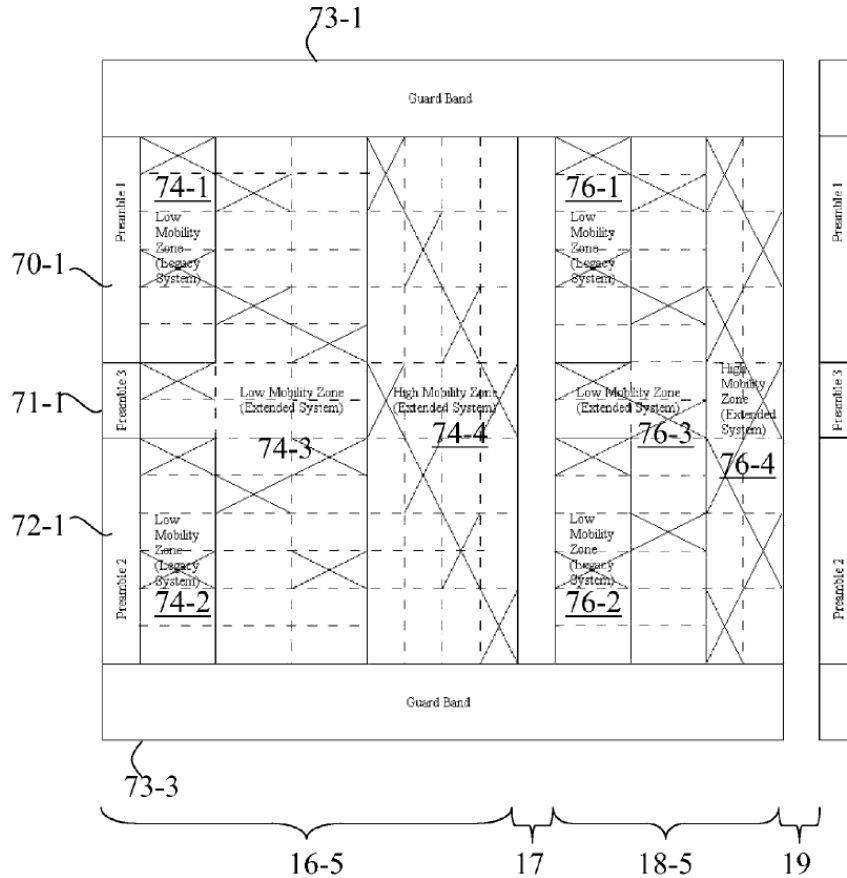


Figure 7 illustrates a placement of signals and pilots in time-domain and frequency-domain of an OFDMA system supporting high mobility and having a scalable bandwidth. *See* Ex. 1001, 4:8–12, 7:38–41. In Figure 7, an upper band and a lower band (guard bands 73-1 and 73-3) carry data or signals. *See id.* at 7:41–46. To satisfy backward compatibility, preambles 70-1 and 72-1 may be similar to those in the conventional OFDMA system. *See id.* at 7:46–48. Signals, pilot symbols, both, or neither may be placed in preamble 71-1. *See id.* at 7:48–50. The placement defines one or more regions, which may include, for example, regions 74-1, 74-2, 76-1 and 76-2 for the old (legacy) OFDMA system, regions 74-3 and 76-3 for the new (extended) OFDMA system supporting lower mobility, and regions 74-4 and 76-4 for the new system supporting high mobility. *See id.* at 7:51–56. The

old OFDMA system and the new OFDMA system supporting lower mobility use the same frequency intervals or the placement of pilot symbols, while the new OFDMA system supporting high mobility uses larger frequency intervals or shorter OFDM symbol period to avoid frequency jitter. *See id.* at 7:56–61. For that purpose, the '096 Patent explains,

the placement of the pilot symbols in a first region such as one of the regions 74-1, 74-2, 76-1 and 76-2 of a frame structure divided for the old OFDMA system may be the same as that in the prior art, the placement of the pilot symbols in a second region such as one of the regions 74-3 and 76-3 of the frame structure divided for the new OFDMA system supporting lower mobility may be the same or denser than the that in the prior art, and the placement of the pilot symbols in a third region such as one of the regions 74-4 and 76-4 of the frame structure divided for the new OFDMA system supporting high mobility may use more denser pilot placement with more pilot symbols for increasing accuracy of the channel estimation.

See id. at 7:61–8:6.

E. Illustrative Challenged Claims

Petitioner challenges claim 8 and substitute claims 44–47, 49, and 50. Pet. 5–6. As explained above in Section I.B., independent claim 8 was found not unpatentable in the '375 IPR Final Written Decision and independent claim 44 and claims 45–47 and 49, dependent therefrom, are substitute claims added by the grant of the '375 IPR Motion to Amend. *See* '375 IPR Mot. to Amend; '375 IPR Final Written Decision. Independent claims 8 and 44 are illustrative and reproduced below (Petitioner's references added in brackets):

8. [pre] A method of constructing a frame structure for data transmission, the method comprising:

- [a] generating a first section comprising data configured in a first format compatible with a first communication system using symbols;
 - [b] generating a second section following the first section, the second section comprising data configured in a second format compatible with a second communication system using symbols, [c] wherein the first communication system's symbols and the second communication system's symbols co-exist in one transmission scheme and [d] wherein the second communication system has pilot symbols that are denser than those in the first communication system;
 - [e] generating at least one non-data section containing information describing an aspect of data in at least one of the first section and the second section; and
 - [f] combining the first section, the second section and the at least one non-data section to form the frame structure.
44. [pre] A method of constructing a frame structure for data transmission, the method comprising:
- [a] generating a first section comprising data configured in a first format compatible with a first communication system using symbols;
 - [b] generating a second section following the first section, the second section comprising data configured in a second format compatible with a second communication system using symbols, [c] wherein the first communication system's symbols and the second communication system's symbols co-exist in one transmission scheme and [d] wherein:
 - the second format is compatible with the second communication system configured to support higher mobility than the first communication system,
 - [e] wherein each symbol in the second communication system has a shorter symbol period than that in the first communication system; and
 - [f] wherein the second communication system has pilot symbols that are denser than those in the first communication system;

- [g] generating at least one non-data section containing information describing an aspect of data in at least one of the first section and the second section; and
- [h] combining the first section, the second section and the at least one non-data section to form the frame structure.

Ex. 1001, 9:6–25; Pet. v-vi; Prelim. Resp. vii–viii.

F. Asserted Patentability Challenges and Asserted Prior Art

Petitioner asserts that claim 8 and substitute claims 44–47, 49, and 50 are unpatentable based on the following grounds and prior art (Pet. 5–6, 18–20, 22–23):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
8, 44–47, 50	102(b) ⁴	Joint Proposal ⁵
49	103(a)	Joint Proposal, Trainin ⁶
8	102(b)	Mujtaba ⁷
8, 44–47, 49, 50	103(a)	Mujtaba, Trainin

II. ANALYSIS

A. Principles of Law

“Under 35 U.S.C. § 102 a claim is anticipated ‘if each and every limitation is found either expressly or inherently in a single prior art reference.’” *King Pharm., Inc. v. Eon Labs, Inc.*, 616 F.3d 1267, 1274 (Fed. Cir. 2010) (quoting *Celeritas Techs. Ltd. v. Rockwell Int’l Corp.*, 150 F.3d

⁴ 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. The ’096 Patent claims entitlement to an effective filing date prior to March 16, 2013, and, therefore, we refer to the pre-AIA version of § 102 and § 103.

⁵ Coffey et al., *IEEE P802.11-Wireless LANs; Joint Proposal: High throughput extension to the 802.11 Standard: PHY*, doc.: IEEE 802.11-05/1102r4, (January 2006) (Ex. 1008, “Joint Proposal”).

⁶ US 2007/0204052 A1, published August 30, 2007 (Ex. 1011, “Trainin”).

⁷ US 2006/0072529 A1, published April 6, 2006 (Ex. 1010, “Mujtaba”).

1354, 1360 (Fed. Cir. 1998)). “Anticipation requires the presence in a single prior art disclosure of all elements of a claimed invention arranged as in the claim.” *Therasense, Inc. v. Becton, Dickinson & Co.*, 593 F.3d 1325, 1332 (Fed. Cir. 2010) (quoting *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983)).

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).

B. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art “in the field of the ’096 patent would have had a Bachelor’s degree in electrical engineering, computer engineering, or a related field, and around two years of experience in the design or development of wireless communication systems, or the equivalent.” Pet. 16 (citing Ex. 1002 ¶ 57).

In turn, Patent Owner submits a slightly different description: that a person of ordinary skill in the art “in the technical field of the ’096 patent would have had at least a master’s degree in computer engineering or electrical engineering, or equivalent work experience, along with at least 1 year of experience related specifically to wireless communications,

including knowledge of MIMO [(Multiple-Input Multiple-Output)] and OFDM.” Prelim. Resp. 22 (citing Ex. 2001 ¶ 18).

For the purpose of determining whether to institute trial, we adopt Patent Owner’s definition of a person of ordinary skill in the art because it is consistent with the level of skill reflected by the ’096 Patent Specification and the asserted prior art but our conclusions would be the same under Petitioner’s definition.

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) (2024); *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 indicates various terms that were construed in *UNM Rainforest Innovations v. Apple Inc.*, 1:20-cv-00351 (W.D. Tex.) (“Apple Litigation”). Pet. 16–18. Petitioner submits that these “claim constructions do not make any material difference as to the Challenged Claims or references relied upon,” and “[a]ll other terms have been given their plain and ordinary meaning.” *Id.* at 17.

Patent Owner, in turn, references particular claim terms in the ’096 Patent that were construed in the Apple Litigation, noting that “Patent Owner agrees with and adopts [these claim constructions] for the purpose of this proceeding.” Prelim. Resp. 22–23 (citing Ex. 1005).

Of note, the numerous claim terms construed in the Apple Litigation and referenced by the parties include the terms “data” and “non-data.” *See* Pet. 8 (citing Ex. 1005); Prelim. Resp. 23 (citing Ex. 1005). Both parties agree that “data” and “non-data” are to be given their plain and ordinary meanings. *See* Pet. 8 (citing Ex. 1005); Prelim. Resp. 23 (citing Ex. 1005).

As demonstrated in the analysis below, for the purpose of determining whether to institute review, 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. Challenge to Claim 8 and Substitute Claims 44–47, and 50
as Anticipated by the Joint Proposal*

Petitioner asserts that claim 8 and substitute claims 44–47 and 50 are anticipated by the Joint Proposal. *See* Pet. 5, 24–43. We begin our analysis by providing a summary of the Joint Proposal followed by addressing the pertinent limitations of the claims and corresponding contentions of the parties.

1. Overview of the Joint Proposal (Ex. 1008)

The Joint Proposal describes a proposal for “High throughput extension to the 802.11 Standard: PHY,” containing the physical layer (“PHY”) parts of the 802.11 Task Group n (“TGn”) Joint Proposal Technical Specification. Ex. 1008, 1 (Title, Abstr.). More particularly, the Joint Proposal specifies the features of a High Throughput (“HT”) device that are necessary to achieve interoperability and “specifies the signals that may be transmitted by the device and received by the device’s receivers.” *Id.* at 10.

The Joint Proposal describes the PHY interface, which interfaces to the media access control (“MAC”) layer through the transmit (“TX”) vector and the receive (“RX”) vector, the TX vector supplying the PHY with per-packet TX parameters. *See id.* at 10 (§ 2). Using the RX vector, the PHY informs the MAC of the received packet parameters. *See id.*

The Joint Proposal also describes PHY Layer Convergence Protocol (“PLCP”) packet format. *See id.* at 10 (§ 3). The Joint Proposal defines two new formats for the PLCP: Mixed Mode and Green Field. *See id.* Figure 1 of the Joint Proposal, reproduced below, shows the legacy, Mixed Mode, and Greed Field formats. *See id.* at 10–11 (§ 3).

Figure 1 of the Joint Proposal is reproduced below:

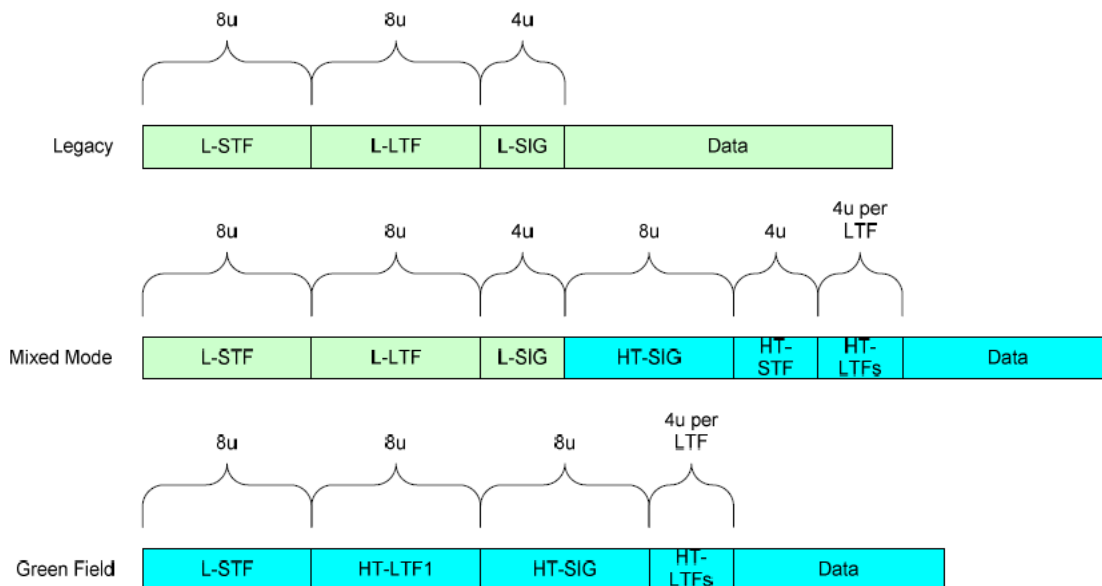


Figure 1 shows the legacy, Mixed Mode, and Green Field PLCP packet formats. *See id.* at 10–11. The Joint Proposal explains that the elements of the PCLP packet formats are: Legacy Short Training Field (“L-STF”); Legacy Long Training Field (“L-LTF”); Legacy Signal Field (“L-SIG”); High Throughput Signal Field (“HT-SIG”); High Throughput Short Training Field (“HT-STF”); First High Throughput Long Training Field (“HT-

LTF1”); additional High Throughput Long Training Fields (“HT-LTFs”); and the Data field which includes the PHY sub-layer Service Data Unit. *See id.* at 11. The Joint Proposal explains that the HT-SIG, HT-STF and HT-LTF’s exist only in Mixed Mode and Green Field packets; and in legacy and legacy duplicate formats, only the L-STF, L-LTF, L-SIG and Data fields exist. *See id.*

According to the Joint Proposal, the PHY will operate in one of 3 modes: Legacy Mode; Mixed Mode; and Green Field. *See id.* at 11–12 (§ 3.1). In Legacy Mode, packets are transmitted in the legacy 802.11a/g format. *See id.* at 11. In Mixed Mode, packets are transmitted with a preamble compatible with legacy 802.11a/g format—the legacy Short Training Field (L-STF), the legacy Long Training Field (L-LTF) and the legacy signal field (L-SIG) are transmitted so they can be decoded by legacy 802.11a/g devices. *See id.* The rest of the packet has a new format. *See id.* In Green Field mode, high throughput packets are transmitted without a legacy compatible part. *See id.* at 12.

The Joint Proposal further provides that the operation of PHY in the frequency domain is divided to the following modes: LM (Legacy Mode—equivalent to 802.11a/g); HT-Mode (in which the device operates in either 40MHz bandwidth or 20MHz bandwidth and with one to four spatial streams); Duplicate Legacy Mode (in which the device operates in a 40MHz channel composed of two adjacent 20MHz channel); 40MHz Upper Mode (used to transmit a legacy or HT packet in the upper 20MHz channel of a 40MHz channel); and 40 MHz Lower Mode (used to transmit a legacy or HT packet in the lower 20MHz channel of a 40MHz channel). *See id.* at 12.

2. Analysis

For the reasons that follow, we are not persuaded that Petitioner establishes sufficiently for the purpose of institution that claim 8 and substitute claims 44–47 and 50 are anticipated by the Joint Proposal.

a. Independent Claim 8

Petitioner contends that the Joint Proposal discloses “generating a first section comprising data configured in a first format compatible with a first communication system using symbols” (“limitation 8[a]”) because, according to Petitioner, “[t]he Joint Proposal teaches that the Mixed Mode packet format includes a legacy field (the claimed first section) consisting of a legacy short training field (L-STF), a legacy long training field (L-LTF) and a legacy signal field (L-SIG) (the claimed data configured a first format).” Pet. 25 (reproducing a portion of Ex. 1008, Fig. 1 (with added annotations); citing Ex. 1008, 11:4–6, 18–23; Ex. 1002 ¶ 177). Petitioner contends that “[t]he legacy field can be used to decode data by legacy 802.11a/g devices (the claimed first communication system), and therefore, enables data transmission in the Mixed Mode packet format to be compatible with legacy devices (e.g., 802.11a devices).” Pet. 25–26 (citing Ex. 1008, 11:4–6, 18–23; Ex. 1002 ¶ 177).

Petitioner also asserts that the Joint Proposal discloses “generating a second section following the first section, the second section comprising data configured in a second format compatible with a second communication system using symbols” (“limitation 8[b]”) because, according to Petitioner, “[t]he Joint proposal teaches “that the packet format further includes an HT field (the claimed second section), which follows the legacy field (the claimed first section) and consists of a signal field (HT-SIG), an HT short

training field (HT-STF), an HT long training field (HT-LTFs) and a data field (data) (the claimed data configured in a second format).” Pet. 26–27 (reproducing a portion of Ex. 1008, Fig. 1 (with added annotations); citing Ex. 1008, 11:7–13; Ex. 1002 ¶ 180). Petitioner asserts “the receiver in the Mixed Mode can decode both the Mixed Mode packets and legacy packets.” Pet. 27 (citing Ex. 1008, 11:22–23; Ex. 1002 ¶ 180). According to Petitioner,

[t]his means that the legacy field (the claimed first section) and the HT field (the claimed second section) enable data transmission in the Mixed Mode packet format to be compatible with legacy devices (e.g., 802.11a devices) (the claimed first communication system) and the new or HT devices (i.e., HT devices or 802.11n devices) (the claimed second communication system), respectively.

Id.

Petitioner also asserts that the Joint Proposal discloses “generating at least one non-data section containing information describing an aspect of data in at least one of the first section and the second section” (“limitation 8[e]”) because, according to Petitioner, “[t]he Joint Proposal specifies a preamble portion in the packet format including a legacy signal field in the legacy field and an HT signal field in the HT field (the claimed non-data section) that carry information (the claimed information) for legacy and HT transmissions.” Pet. 32–33 (reproducing a portion of Ex. 1008, Fig. 1 (with added annotations); citing Ex. 1008, 11:18–21; Ex. 1002 ¶ 199). Petitioner further contends:

The Joint Proposal further specifies that the HT signal field in the HT field (the claimed second section) carries information indicating a number of aspects of the data in the HT transmission including, for example, modulation and coding scheme, bandwidth, the number of data bytes in the data

field . . . , and the length of symbol period (the claimed information describing an aspect of data).

Pet. 33 (citing Ex. 1008, 26:13–16, 56:1–6, Table 7; Ex. 1002 ¶¶ 200–201).

According to Petitioner, a person of ordinary skill in the art “would understand that the information carried in the HT SIG field (the claimed no[n]-data section) for the HT field (the claimed second section) describes various aspects of data in the HT transmission such as modulation and coding scheme, length of data field, and symbol period.” *Id.* (citing Ex. 1002 ¶ 203).

In response, Patent Owner contends that the Joint Proposal’s legacy signal field (L-SIG) is not “data” as recited in limitation 8[a]. *See* Prelim. Resp. 25 (citing Ex. 2001 ¶ 60). Patent Owner asserts that a person of ordinary skill “would understand that the L-SIG field contains control information used to decode packets in legacy format. . . . The only ‘data’—as claimed—is sent in the ‘Data’ section of the mixed mode packet.” *Id.* (citing Ex. 2001 ¶ 60). According to Patent Owner, “[t]his is corroborated by Petitioner’s identification of the corresponding HT-SIG field as ‘non-data’ in the HT section . . . and the ‘Data’ field as the claimed data.” *Id.* (citing Pet. 68, 77). Patent Owner also asserts that Petitioner relies on the same mixed mode format in *Mujtaba* (for the third asserted ground of unpatentability) as the mixed mode format disclosed in the Joint Proposal, but identifies the payload as the claimed data, and asserts the legacy signal field and HT signal field are the claimed non-data section. *See id.* (quoting Pet. 55; citing Prelim. Resp. 35–36).

We agree with Patent Owner that the Joint Proposal’s legacy signal field (L-SIG) does not disclose data as recited in limitation 8[a]. Both parties agree that the term “data” should be construed according to its plain

and ordinary meaning. *See* Pet. 16–18; Prelim. Resp. 22–23. The ’096 Patent utilizes the term “data” in accordance with its plain and ordinary meaning. *See* Ex. 1001 *generally*. We find that the Joint Proposal likewise utilizes the term “data” in accordance with its plain and ordinary meaning, to describe data fields that include the PHY sub-layer Service Data Unit, and shown in each of the legacy PLCP packet format, Mixed Mode PLCP packet format, and Green Field PLCP packet format that include the PHY sub-layer Service Data Unit. *See* Ex. 1008, 11:11–13, Fig. 1. Indeed, in addressing limitation 8[b], Petitioner identifies the Joint Proposal’s data field in the Mixed Mode PLCP format as disclosing “data configured in a second format compatible with a second communication system,” as recited in limitation 8[b]. *See* Pet. 26–27. Petitioner, however, does not direct us to where the Joint Proposal discloses or describes the legacy signal field (L-SIG) as “data” according to its plain and ordinary meaning. *See* Pet. 25–26. Petitioner’s citations to the Joint Proposal fail to provide sufficient support for Petitioner’s position that L-SIG discloses “data” in accordance with its plain and ordinary meaning. *See* Ex. 1008, 11:4–6, 11:18–23. Petitioner further does not provide sufficient explanation why the Joint Proposal’s L-SIG otherwise constitutes “data,” according to the plain and ordinary meaning. *See* Pet. 25–26. The testimony of Dr. Hansen, cited by Petitioner to support its arguments, is no more illuminating. *Compare* Pet. 25–26, with Ex. 1002 ¶ 177.

Moreover, as pointed out by Patent Owner (*see* Prelim. Resp. 25), Petitioner’s position is undermined by and inconsistent with its arguments that the Joint Proposal’s data field discloses “data configured in a second format compatible with a second communication system,” as recited in

limitation 8[b] and HT-SIG discloses “at least one non-data section,” as recited in limitation 8[e]. These arguments do not comport with Petitioner’s argument that L-SIG discloses data configured in a first format compatible with a first communication system. Furthermore, as pointed out by Patent Owner (*see* Prelim. Resp. 25), Petitioner’s position is also undermined by and inconsistent with its position addressing the patentability challenge based on Mujtaba that identifies Mujtaba’s legacy signal field as “at least one non-data section,” as recited in limitation 8[e] (*see* Pet. 54–55) and identifies Mujtaba’s payload (i.e., data) as “data compatible with the first communication system” and “data compatible with the second communication system” as recited in limitations 8[a] and 8[b] (*see* Pet. 49–51). These arguments addressing the patentability challenge based on Mujtaba are directly in opposition to Petitioner’s position that the Joint Proposal’s legacy signal field (L-SIG) discloses data configured in a first format compatible with a first communication system.

Based on the record before us, Petitioner does not set forth sufficient argument and evidence to demonstrate that the Joint Proposal’s legacy signal field (L-SIG) discloses “data configured in a first format compatible with a first communication system using symbols,” as recited in limitation 8[a] in accordance with the plain and ordinary meaning for “data.”

b. Substitute Independent Claim 44

Substitute independent claim 44 recites limitations identical to the limitations of claim 8 addressed in Section II.D.2.a. *Compare* Ex. 1001, 9:6–25 (limitations 8[a], 8[b], 8[e], *with* Ex. 1006, 15–16 (limitations 44[a], 44[b], 44[g]). Petitioner’s arguments and evidence addressing the identical limitations recited in independent claim 44 rely on the same arguments and

evidence as presented when addressing claim 8. *See* Pet. 35 (citing Pet. 24–35; Ex. 1002 ¶ 207).

For the same reasons as those explained above addressing claim 8, Petitioner does not set forth sufficient argument and evidence to demonstrate that the Joint Proposal discloses “generating a first section comprising data configured in a first format compatible with a first communication system using symbols” in accordance with the plain and ordinary meaning for “data,” as recited in claim 44.

c. Substitute Dependent Claims 45–47 and 50

Due to the dependency of substitute claims 45–47 and 50 from claim 44 (*see* Ex. 1006, 16) and for the same reasons as those explained above addressing independent claims 8 and 44 in Sections II.D.2.a and II.D.2.b, Petitioner does not set forth sufficient argument and evidence to demonstrate that the Joint Proposal discloses the limitations of claims 45–47 and 50.

d. Summary

For the foregoing reasons and based on the record before us, there is not a reasonable likelihood that Petitioner would prevail in showing that claim 8 or any of substitute claims 44–47, and 50 are anticipated by the Joint Proposal.

E. Challenge to Substitute Claim 49 as Unpatentable as Obvious over the Joint Proposal and Trainin

Substitute claim 49 depends from claim 44. Ex. 1006, 16. Petitioner asserts that the subject matter of dependent claim 49 is obvious over the Joint Proposal and Trainin. Pet. 5, 44–48. As applied by Petitioner, the teachings of Trainin do not remedy the deficiencies of the Joint Proposal

identified above in Sections II.D.2.a. and II.D.2.b., addressing claim 8 and substitute claim 44. *See* Pet. 44–48.

Due to the dependency of claim 49 from claim 44 and for the same reasons as those explained above addressing claim 8 and substitute claim 44 in Sections II.D.2.a and II.D.2.b., Petitioner does not set forth sufficient argument and evidence to demonstrate that the subject matter of claim 49 would have been obvious over the Joint Proposal and Trainin.

Patent Owner presents arguments addressing secondary considerations. *See* Prelim. Resp. 57. We need not address secondary considerations because Petitioner does not set forth sufficient argument and evidence to demonstrate that the subject matter of claim 49 would have been obvious.

For the foregoing reasons and based on the record before us, there is not a reasonable likelihood that Petitioner would prevail in showing that substitute claim 49 is unpatentable as obvious over the Joint Proposal and Trainin.

F. Challenge to Claim 8 as Anticipated by Mujtaba

Petitioner asserts that claim 8 is anticipated by Mujtaba. Pet. 5, 48–56. We begin our analysis by providing a summary of Mujtaba followed by addressing the pertinent claim limitations and the corresponding contentions of the parties.

1. Overview of Mujtaba (Ex. 1010)

Mujtaba is titled “Method and Apparatus for Varying the Number of Pilot Tones in a Multiple Antenna Communication System.” Ex. 1010, code (54). In Mujtaba’s method and apparatus, data is transmitted in a multiple antenna communication system by selecting a number of pilot tones

to be employed to transmit the data. *See id.* at code (57). An indication of the selected number of pilot tones is transmitted in a preamble of a packet containing the data. *See id.* Data is received in a multiple antenna communication system by receiving the preamble having an indication of a number of pilot tones embedded in the data, and the received data is processed based on the indicated number of pilot tones. *See id.* The indication of the selected number of pilot tones may be transmitted in a SIGNAL field of an exemplary IEEE 802.11 preamble, and the number of pilot tones may be selected based on one or more of (i) a delay spread of a channel; (ii) the SNR (signal to noise ratio) at the receiver; or (iii) a number of antennas at a receiver. *See id.*

Figure 2 of Mujtaba is reproduced below:

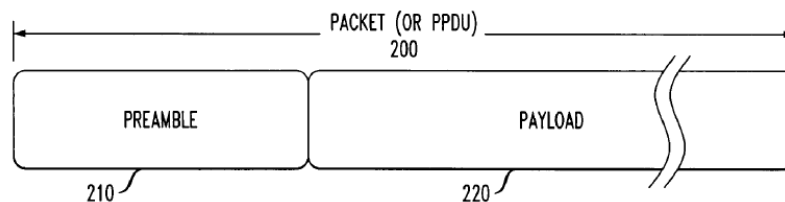


Figure 2 illustrates a typical packet format 200 for an exemplary IEEE 802.11 or another IP-based OFDM system. *See id.* ¶¶ 12, 18. Mujtaba explains that in a conventional 802.11 a/g transceiver, the information bits are first encoded at a transmitter side stage, and then frequency interleaved. *See id.* ¶ 16. The encoded and interleaved bits are then mapped onto subcarriers (tones) and form a frequency domain OFDM signal. *See id.* The frequency domain OFDM signal is then translated to the time domain by an inverse Fast Fourier Transform. *See id.* The data is then serialized, and a guard interval is added to each OFDM symbol. *See id.* Finally, a preamble including training and signal fields is added at the beginning of each packet. *See id.* At the receiver side, the received signal is initially

processed by an RF front end, and then the serial data is parallelized and the guard interval is removed. *See id.* ¶ 17. The time domain signal is translated to the frequency domain using a Fast Fourier Transform, and the subcarriers are demapped to encoded and interleaved bits. *See id.* At the same time, the preamble is processed and the interleaved bits are deinterleaved and decoded to provide the transmitted information bits. *See id.*

As shown in Mujtaba's Figure 2, each packet 200 or PLCP Protocol Data Unit (for wireless local area networks) comprises a preamble 210 and a payload 220. *See id.* ¶ 18. Each preamble 210 contains all relevant information needed to decode payload 220, such as synchronization information and a SIGNAL field. *See id.* Payload 220 contains data and one or more pilot tones. *See id.*

Figure 3 of Mujtaba is reproduced below:

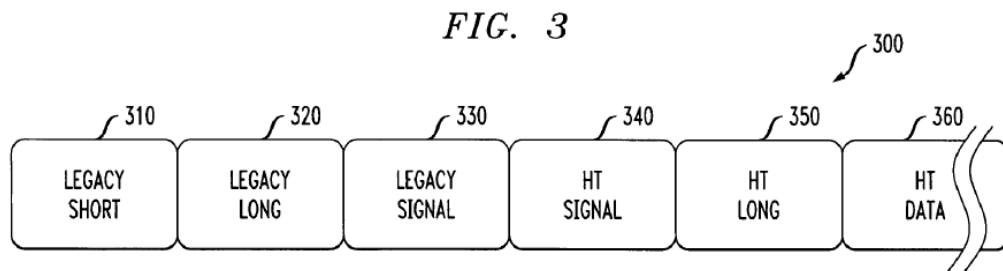


Figure 3 illustrates an exemplary format of the preamble of Figure 2 for IEEE 802.11n. *See id.* ¶¶ 13, 19. Mujtaba explains that the existing HT Signal field can be used to signal to the receiver the number of pilot tones that were employed. *See id.* ¶ 19. As shown in Figure 3, preamble 300 includes a legacy short training symbol 310, a legacy long training symbol 320, a legacy SIGNAL field 330, a HT SIGNAL field 340, a HT long training symbol 350, and a HT data field (payload) 360, and the HT SIGNAL field 340 can convey to the receiver the number of pilot tones. *See*

id. For example, HT SIGNAL field 340 can be encoded with a value indicating whether two, four, or six pilot tones were employed. *See id.*

Mujtaba recognizes that

the optimum number of pilots varies with operating parameters. The various criteria used to select the number of pilot tones is application specific and outside the scope of the present invention. In general, the number of pilot tones can be selected, for example, based on the delay spread of the channel, or the SNR at the receiver, or the number of antennas at the receiver (or all of the above). In this manner, the present invention allows the increased accuracy provided by a greater number of pilots to be balanced against the resulting reduction in data rate. As previously indicated, a greater number of pilots increases the accuracy of the CPE [(common phase error)] estimation, thereby reducing the packet error rate, and increasing the reliability of the transmission. A greater number of pilots, however, reduces the effective data rate, since actual data is now replaced by the pilots (which are known at both the transmitter and the receiver).

From an efficiency perspective, the lowest number of pilots to achieve the desired robustness is desirable. In other words, from an efficiency perspective, data should be transmitted on as many tones as possible.

Id. ¶¶ 21–22.

Figure 4 of Mujtaba is reproduced below:

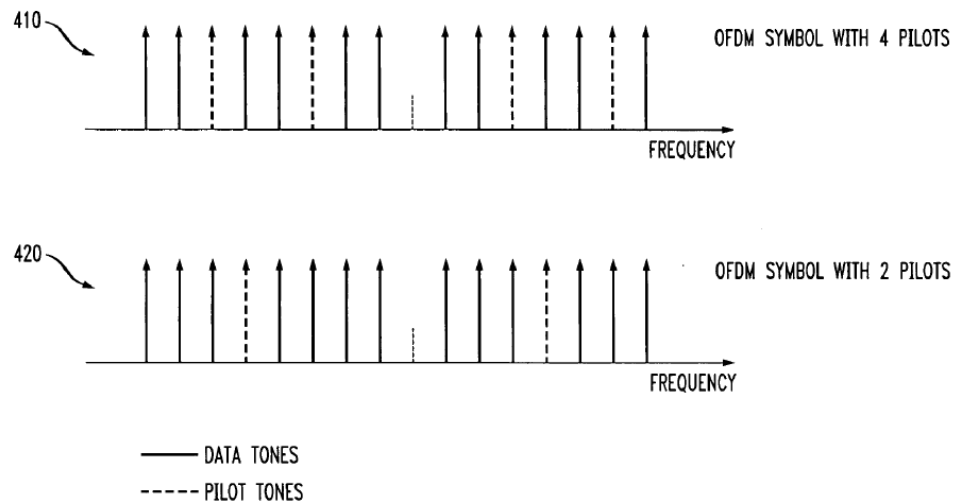


Figure 4 illustrates OFDM symbol 410 with four pilot tones, and OFDM symbol 410 with two pilot tones. *See id.* ¶¶ 14, 24.

2. Analysis

For the reasons that follow, we are not persuaded that Petitioner establishes sufficiently for the purpose of institution that claim 8 is anticipated by Mujtaba.

Petitioner contends that Mujtaba discloses limitation 8[a] because, according to Petitioner, “Mujtaba teaches [a] packet format with a preamble including a legacy field (the claimed first section) consisting of a legacy short training field (310), a legacy long training field (320) and a legacy signal field (330)” and “explains that each preamble can be used to decode payload.” Pet. 49 (reproducing a portion of Ex. 1010, Fig. 3 (with added annotations); citing Ex. 1010 ¶¶ 18–19; Ex. 1002 ¶ 271). According to Petitioner, a person of ordinary skill in the art, “would understand from Mujtaba that the legacy field (the claimed first section) carries information in the legacy format (the claimed first format) that enables payload (*i.e.*,

data) to be compatible with legacy devices (the claimed first communication system).” *Id.* (citing Ex. 1002 ¶ 271).

Petitioner also asserts that Mujtaba discloses limitation 8[b] because, according to Petitioner, “Mujtaba teaches that preamble (300) includes an HT field (the claimed second section) following the legacy field (the claimed first section).” Pet. 50 (reproducing a portion of Ex. 1010, Fig. 3 (with added annotations); citing Ex. 1010 ¶ 19; Ex. 1002 ¶ 275). According to Petitioner, a person of ordinary skill in the art, “would have understood from Mujtaba that the HT field (the claimed first section) carries information in the HT format (the claimed second format) that enables payload (*i.e.*, data) to be compatible with HT devices (the claimed second communication system).” Pet. 49–50 (citing Ex. 1002 ¶ 276).

Patent Owner argues that Mujtaba does not disclose limitations 8[a] and 8[b] because Petitioner identifies the same payload (*i.e.*, data) as the claimed data of the first section and the claimed data of the second section. *See* Prelim. Resp. 35 (reproducing Petitioner’s annotated Mujtaba Figure 3; citing Pet. 49, 51). Patent Owner asserts that “*Mujtaba* does not disclose two data payloads in a frame, all embodiments only have a single data payload.” *Id.* at 36 (reproducing Petitioner’s annotated Mujtaba Figure 3); citing Ex. 2001 ¶ 86); *see* Ex. 1010 ¶ 19. According to Patent Owner, “in Figure 3, the data is indicated in HT format, Figure 3 relates to the HT transmission that includes only HT data 360.” Prelim. Resp. 36 (citing Ex. 2001 ¶ 87). Patent Owner contends that Petitioner’s contention regarding the understanding of a person of ordinary skill in that art pertaining to limitation 8[a] “is incorrect as Mujtaba does not disclose the

transmission of legacy data, only HT data in Figure 3.” *Id.* (quoting Ex. 2001 ¶ 88).

Patent Owner further asserts “the same payload data field cannot be both, the data of the first section in a first format and the data of the second section in a second format.” Prelim. Resp. 37 (quoting Ex. 2001 ¶ 89); *see id.* at 37–38. Patent Owner asserts that although there are two headers (legacy and HT) in Mujtaba, there is only one data section. *See id.* at 37 (citing Ex. 2001 ¶ 89).

We agree with Patent Owner’s arguments that Petitioner does not show sufficiently that Mujtaba discloses limitations 8[a] and 8[b]. Patent Owner’s argument that Mujtaba does not disclose two payloads (i.e., data) in a frame is supported by the disclosure of Mujtaba. *See* Ex. 1010 ¶ 19, Fig. 3. We agree that claim 8 requires at least two payloads (i.e., data), because limitation 8[a] recites “a first section comprising data configured in a first format,” limitation 8[b] recites “the second section comprising data configured in a second format,” and limitation 8[f] recites “combining the first section [and] the second section . . . to form the frame structure.” Ex. 1001, 9:8–13, 9:24–25.

Based on the record before us, Petitioner does not set forth sufficient argument and evidence to demonstrate that Mujtaba discloses limitations 8[a] and [8b]. Accordingly, there is not a reasonable likelihood that Petitioner would prevail in showing that claim 8 is anticipated by Mujtaba.

G. Challenge to Claim 8 and Substitute Claims 44–47, 49, and 50 as Unpatentable as Obvious over Mujtaba and Trainin

Petitioner asserts that claims 8, 44–47, 49, and 50 are unpatentable as obvious over the combined teachings of Mujtaba and Trainin. *See* Pet. 56–68. For the reasons that follow, we are not persuaded that Petitioner

establishes sufficiently for the purpose of institution that claim 8 and substitute claims 44–47, 49, and 50 are unpatentable as obvious over Mujtaba and Trainin.

1. Independent Claim 8

As applied by Petitioner, the teachings of Trainin do not remedy the deficiencies of Mujtaba regarding limitations 8[a] and 8[b] identified above in Section II.F.2. *See* Pet. 56–61. For these reasons, and including the same reasons as those explained above addressing claim 8 in Section II.F.2., Petitioner does not set forth sufficient argument and evidence to demonstrate that the combination of Mujtaba and Trainin teaches or suggests limitations 8[a] and [8b].

2. Substitute Independent Claim 44

Independent claim 44 recites limitations identical to the limitations of claim 8 addressed in Section II.F.2. *Compare* Ex. 1001, 9:6–25 (limitations 8[a], 8[b], 8[f], *with* Ex. 1006, 15–16 (limitations 44[a], 44[b], 44[h]). Petitioner’s arguments and evidence addressing the identical limitations recited in substitute independent claim 44 relies on the same arguments and evidence presented addressing claim 8. *See* Pet. 61 (citing Pet. 59–61; Ex. 1002 ¶ 318).

For the same reasons as those explained above addressing claim 8, Petitioner does not set forth sufficient argument and evidence to demonstrate that the combination of Mujtaba and Trainin teaches or suggests limitations 44[a] and 44[b].

3. Substitute Dependent Claims 45–47, 49, and 50

Due to the dependency of claims 45–47, 49, and 50 from claim 44 (*see* Ex. 1006, 16) and for the same reasons as those explained above

addressing independent claims 8 and 44, Petitioner does not set forth sufficient argument and evidence to demonstrate that the combination of Mujtaba and Trainin teaches or suggests the limitations of substitute dependent claims 45–47, 49, and 50.

4. Secondary Considerations

Patent Owner presents arguments addressing secondary considerations. *See* Prelim. Resp. 57. We need not address secondary considerations because Petitioner does not set forth sufficient argument and evidence to demonstrate that the subject matter of claim 8 and substitute claims 44–47, 49, and 50 would have been obvious.

5. Summary

For the foregoing reasons and based on the record before us, there is not a reasonable likelihood that Petitioner would prevail in showing that claim 8 and substitute claims 44–47, 49, and 50 are unpatentable as obvious over Mujtaba and Trainin.

H. 35 U.S.C. 325(d)

Patent Owner argues that the Board should exercise discretion to deny the Petition under 35 U.S.C. § 325(d). *See* Prelim. Resp. 10–16. Because we deny institution on the merits of the patentability challenges to claim 8 and substitute claims 44–47, 49, and 50, we need not address arguments regarding the exercise of discretion under 35 U.S.C. § 325(d).

III. CONCLUSION

For the foregoing reasons, we determine there is not a reasonable likelihood that Petitioner would prevail in showing at least one of claim 8, and substitute claims 44–47, 49, and 50 of the '096 Patent is unpatentable.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), the Petition is denied, and no *inter partes* review is instituted.

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Patent 8,265,096 B2

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