

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,
Petitioner,

v.

WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC.,
Patent Owner.

IPR2025-01110
Patent 11,716,171 B2

Before KRISTEN L. DROESCH, JON M. JURGOVAN, and
DANIEL J. GALLIGAN, *Administrative Patent Judges*.

DROESCH, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. Background

Samsung Electronics Co., Ltd. (“Petitioner”) filed a petition requesting *inter partes* review of claims 1–16 of U.S. Patent No. 11,716,171 B2 (Ex. 1001, “171 Patent”). Paper 2 (“Pet.” or “Petition”). Petitioner filed a Declaration of Zhi Ding, Ph.D., with its Petition. Ex. 1003. Wilus Institute of Standards and Technology Inc. (“Patent Owner”) timely filed a preliminary response. Paper 9 (“Prelim. Resp.” or “Preliminary Response”).

With prior authorization, Patent Owner filed a supplemental brief (Paper 12, “Supp. Br.” or “Supplemental Brief”) to address Petitioner’s claim construction positions between the district court proceedings and this proceeding, and Petitioner filed a reply to the supplemental brief (Paper 13, or “Reply”).

Pursuant to the *Interim Processes for PTAB Workload Management Memorandum* (“Memorandum”) issued on March 26, 2025, Patent Owner filed its Discretionary Denial Brief on August 25, 2025. Paper 8. Petitioner filed its Opposition Brief on September 24, 2025. Paper 10. On October 10, 2025, Acting Chief Administrative Patent Judge Deshpande issued a decision determining that discretionary denial of institution is not appropriate in this case and referring the Petition to us for merits and other non-discretionary statutory considerations.¹ Paper 11.

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

¹ Deputy Director Stewart was recused in this matter.

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).

For the reasons provided below, we determine, based on the record before us, there is a reasonable likelihood Petitioner would prevail in showing at least one of the challenged claims is unpatentable.

B. Real Parties-In-Interest

Petitioner indicates that Samsung Electronics Co., Ltd., and Samsung Electronics America, Inc., are the real parties-in-interest. Pet. 82. Patent Owner indicates that Wilus Institute of Standards and Technology Inc. is the real party-in-interest. Paper 7, 1.

C. Related Matters

The parties indicate that the ’171 Patent is or was involved in the following district court proceedings: *Wilus Institute of Standards and Technology Inc. v. HP Inc.*, 2:25-cv-00069 (E.D. Tex.); and *Wilus Institute of Standards and Technology Inc. v. Samsung Electronics Co., Ltd.*, 2:25-cv-00070 (E.D. Tex.). Pet. 82; Paper 7, 1–2.

D. The ’171 Patent (Ex. 1001)

The ’171 Patent is directed to “a wireless communication terminal and a wireless communication method for efficiently managing simultaneous data transmissions of a plurality of terminals.” Ex. 1001, 1:23–28.

According to the ’171 Patent, in a wireless LAN including an access point (AP) and a number of stations (STAs), “a multi-user uplink transmission in which a plurality of STAs simultaneously transmit data to the AP may be performed.” *Id.* at 10:46–48; *see id.* at 10:31–34. The ’171 Patent explains that “[i]n order to perform the multi-user uplink transmission, the channel to be used and the transmission start time of each STA that performs uplink

transmission should be adjusted.” *Id.* at 10:49–51. More specifically, “in order to allocate resources and prevent data collision, the AP should obtain the buffer status information of each STA and deliver the accurate transmission time point information to each STA before the start of multi-user uplink transmission.” *Id.* at 11:15–19.

In an embodiment, multi-user uplink transmission “may be initiated by a trigger frame.” Ex. 1001, 17:26–27. “The trigger frame indicates the start point of the multi-user uplink transmission and may indicate information on the channel or sub-channel allocated to each uplink transmission STA.” *Id.* at 17:32–35. “When the multi-user uplink transmission is completed, the AP transmits a multiplexed group ACK in response thereto.” *Id.* at 17:38–39.

Figure 20 of the '171 Patent is reproduced below.

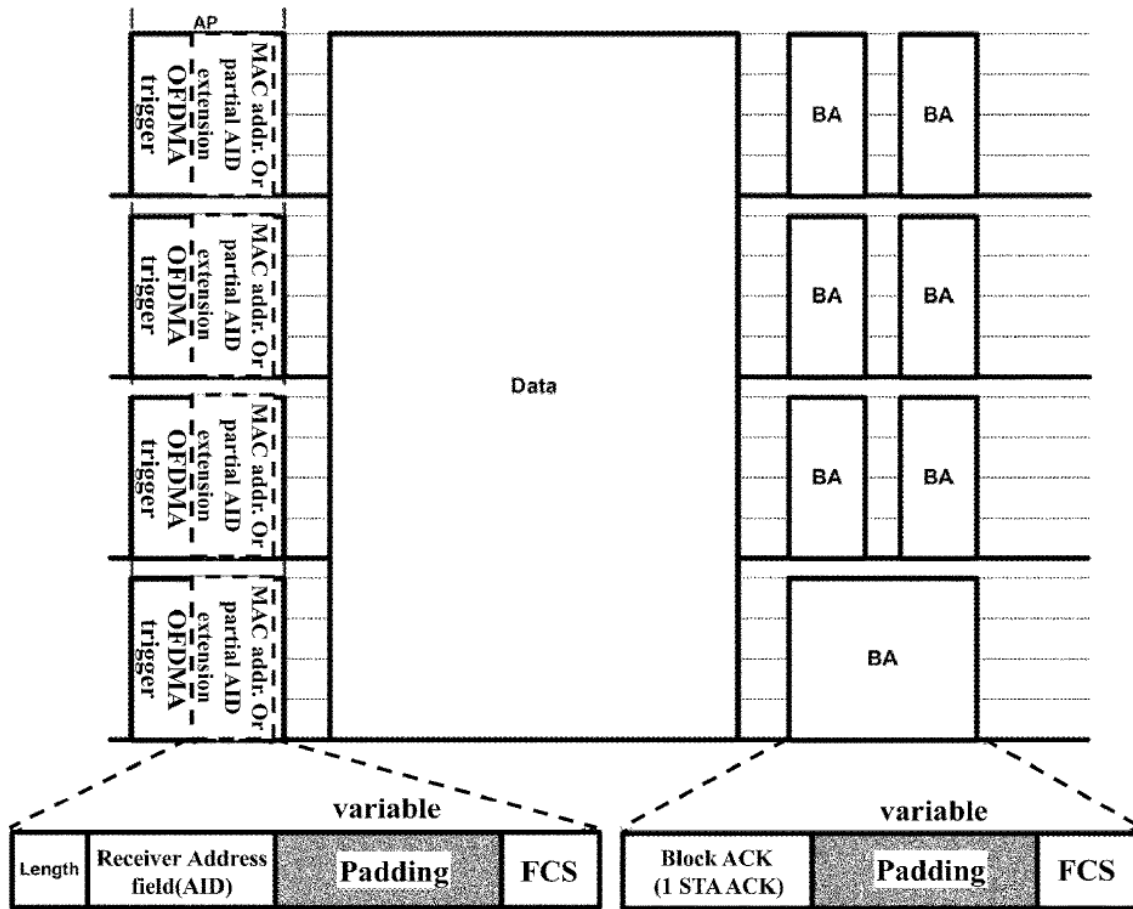


Figure 20 depicts “a method of frame length alignment by padding in a multi-user simultaneous transmission.” Ex. 1001, 19:65–66. As shown in Figure 20, “[t]he trigger frame may include AID information of the STA assigned to each channel, and the amount of information of the transmitted trigger frame may be different for each channel.” *Id.* at 20:6–9. Further, “a predetermined padding may be performed before a Frame Check Sequence (FCS) field of the trigger frame.” *Id.* at 20:10–12. “[T]he transmission of the trigger frame may be terminated at the same time in each channel through which the trigger frame is transmitted.” *Id.* at 20:12–15.

E. Illustrative Claim

Claims 1 and 9 are independent, and claims 2–8 and 10–16 depend directly or indirectly therefrom, respectively. Ex. 1001, 22:16–23:30.

Claim 1 is illustrative and reproduced below:

[1Pre] A wireless communication terminal, the terminal comprising:

[1.1] a transceiver; and

[1.2] a processor,

[1.3] wherein the processor is configured to:

receive a frame for allocating resource for uplink (UL) multi-user (MU) transmission to one or more terminals,

[1.4] wherein the frame includes an association identifier (AID) field and a frame check sequence (FCS) field,

[1.5] wherein the AID field is set to a value related to a first padding field, when the first padding field is included in the frame,

[1.6] wherein the first padding field is used to adjust a length of the frame, and

[1.7] wherein the first padding field is related to a preparation of a response frame for the frame, and

[1.8] transmit the response frame in response to the frame.

Ex. 1001, 22:16–33 (Petitioner’s labels added in brackets).

F. Asserted Patentability Challenges and Asserted Prior Art

Petitioner asserts that claims 1–16 are unpatentable based on the following grounds (Pet. 1):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–16	103 ²	Kim ³
1–16	103	Chu, ⁴ Choi ⁵

II. ANALYSIS

A. Supplemental Briefing Regarding Petitioner’s Claim Construction Positions Before the District Court

Patent Owner contends that, in the District Court, Petitioner asserted that claims 1–10 of the ’171 Patent are indefinite. *See* Supp. Br. 1 (citing Ex. 2011, 3). Following issuance of *Revvo Techs., Inc. v. Cerebrum Sensor Techs., Inc.*, IPR2025-00632, Paper 20 (PTAB Nov. 3, 2025) (precedential) and *Tesla, Inc. v. Intellectual Ventures II LLC*, IPR2025-00340, Paper 18 (PTAB Nov. 5, 2025) (informative), Petitioner withdrew its indefiniteness contentions. *See id.* (citing Ex. 2012, 1).

Patent Owner asserts that Petitioner has offered no explanation in either proceeding why Petitioner adopted inconsistent claim construction positions between the proceedings. *See* Supp. Br. 2. According to Patent Owner, Petitioner’s

² The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011), amended 35 U.S.C. § 103 effective March 16, 2013. Because the ’171 Patent claims an earliest effective filing date after the effective date of the applicable AIA amendment, we refer to the AIA version of § 103.

³ US 2019/0357256 A1, published November 21, 2019 (Ex. 1015, “Kim”).

⁴ US 2015/0131517 A1, published May 14, 2015 (Ex. 1016, “Chu”).

⁵ US 2015/0230244 A1, published August 13, 2015 (Ex. 1017, “Choi”).

adoption of inconsistent claim construction arguments between its district court position and its Petition not only generated the risk with which the Patent Office was concerned [(i.e., reducing the potential for inconsistency in the interpretation of claim terms)], but also unfairly forced Patent Owner to prepare a response to [Petitioner]’s indefiniteness theories in district court before [Petitioner] summarily ‘withdrew’ those arguments, also without explanation.

Supp. Br. 2. Patent Owner further contends that “[f]ailure to disclose Samsung’s belief that all of the claims of the ’171 patent were indefinite also deprived the Board of information relevant to the institution decision.” *Id.* According to Patent Owner, Petitioner’s “unexplained, materially inconsistent claim-interpretation positions between district court and the Board are themselves a sufficient basis for . . . denial.” *Id.* at 2–3 (citing *Tesla*, Paper 18 at 4; *Revvo*, Paper 20 at 4–5). Patent Owner asserts that the Petition should be denied because Petitioner fails to provide an explanation why the different claim construction positions are warranted, and offers no justification for advancing different positions. *See id.* at 3 (citing *Tesla*, Paper 18 at 3; *Revvo*, Paper 20 at 5).

Petitioner contends that the district court proceeding is still in its early stages and the parties have not filed claim construction briefs. *See* Reply 1 (citing Ex. 2001, 5–6). Petitioner contends that only a preliminary proposal of claim terms has been exchanged and, in that proposal, only three claims were preliminarily identified as potentially indefinite to comply with the P.R. 4-1 proposed claim terms deadline. *See id.* (citing Ex. 1135, 3). Petitioner asserts that, to comply with the Nov. 13, 2025, P.R. 4-2 preliminary construction deadline, Petitioner agreed to withdraw contentions as to indefiniteness for all claim terms. *See id.* at 2 (citing Ex. 1134, 1). According to Petitioner, “in the district court proceeding, Petitioner is not

proposing any construction or advancing any assertion that any of the '171 patent claims are indefinite.” *Id.* In any event, Petitioner further “confirms and further stipulates that Petitioner will not pursue any position that any of the '171 patent claims are indefinite.” *Id.* Petitioner further argues that “*Revvo* and *Tesla* are simply not relevant here because Petitioner’s claim construction positions in both proceedings are consistent and do not include indefiniteness.” *Id.* at 3.

We agree with Petitioner’s arguments. Petitioner’s subsequent withdrawal of any indefiniteness contentions in compliance with the filing deadline for P.R. 4-2 Exchange of Preliminary Claim Constructions obviates the concerns addressed in *Revvo* and *Tesla*—that advancing inconsistent claim constructions in two forums detracts from the Office’s goal of providing greater predictability and certainty in the patent system.

B. Claim Construction

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

“Petitioner submits that no formal claim constructions are necessary.” Pet. 1–2. Similarly, “Patent Owner does not contend that any formal claim construction is necessary” at this stage of the proceeding. Prelim. Resp. 5.

For the purpose of institution, we need not explicitly construe any claim terms. *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))).

C. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art “would have had a Bachelor’s degree in electrical engineering, computer engineering, computer science, or a related field, and at least 3 years of experience in the research, design or development of wireless communication devices, systems, and/or networks, or the equivalent, as of the Critical Date,” and that “[i]ncreased educational experience can make up for less work experience, and vice versa.” Pet. 2 (citing Ex. 1003 ¶¶ 26–28).

Patent Owner does not dispute Petitioner’s proposed level of ordinary skill in the art, except as to the date that pertains to such skill level. Prelim. Resp. 4–5. Namely, Patent Owner asserts that “Petitioner is incorrect” that “the ’171 Patent is entitled to an effective date of no earlier than January 22, 2021.” *Id.* at 5.

For the purpose of institution, we adopt Petitioner’s definition of a person of ordinary skill in the art because it is consistent with the level of skill reflected by the ’171 Patent Specification and the asserted prior art, except that we delete the qualifier “at least” to eliminate vagueness as to the amount of required experience.

D. Principles of Law

A claim is unpatentable “if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed

invention to a person having ordinary skill in the art to which the claimed invention pertains.” 35 U.S.C. § 103; *see 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).⁶

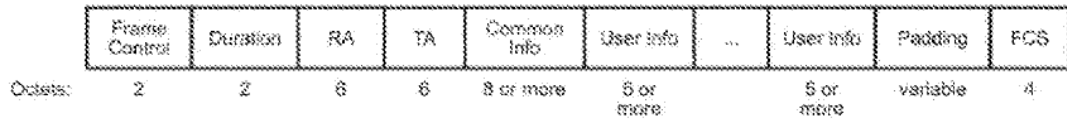
E. Challenge to Claims 1–16 over Kim

1. Overview of Kim (Ex. 1015)

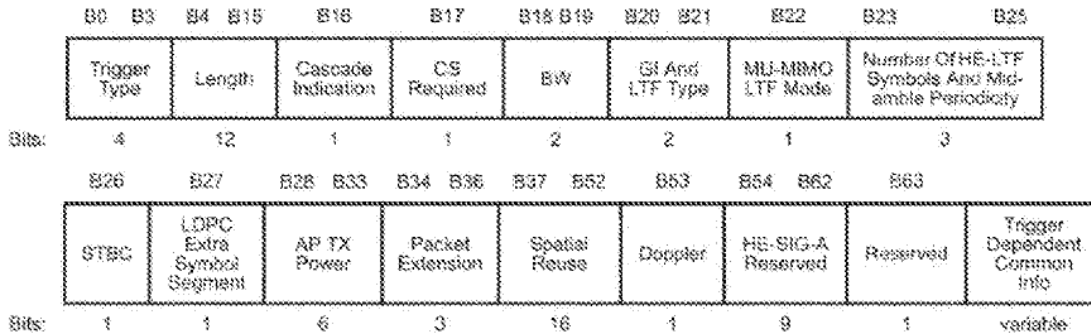
Kim has a filing date of January 8, 2018. Ex. 1015, code (21). Kim also lists three provisional applications having filing dates as early as January 8, 2017. *Id.*, code (60). Kim is directed to “performing channel access by a station (STA) in a wireless local area network (WLAN) system.” *Id.* ¶ 6. In particular, Kim discloses that the “system may employ uplink (UL) multi-user (MU) transmission,” which “may be started when an AP transmits a trigger frame to a plurality of STAs.” *Id.* ¶ 131.

⁶ At this stage, the parties do not present evidence or arguments addressing secondary considerations.

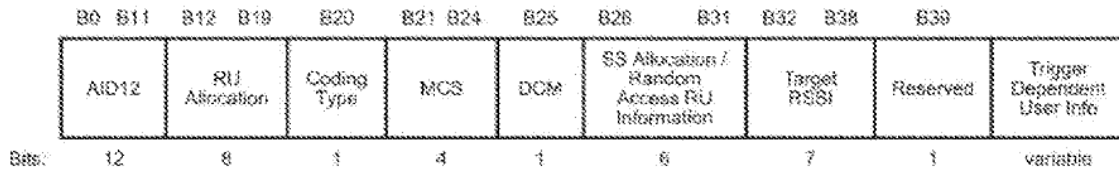
Figure 17 is reproduced below.



(a) Trigger frame



(b) Common Info field of Trigger frame



(c) User Info field of Trigger frame

Figure 17 depicts “a trigger frame format according to an embodiment.” Ex. 1015 ¶ 135. As shown in Figure 17(a) above, the trigger frame may include “one or more Per User Information (Info) fields, a Padding field, and a Frame Check Sequence (FCS) field.” *Id.* ¶ 136. As shown in Figure 17(c) above, “the User Information field may include . . . an AID 12 subfield,” where “[t]he AID 12 subfield indicates the LSB 12 bits of the AID of a[] STA that will receive the corresponding user information field.” *Id.* ¶ 138. Kim discloses that “[w]hen the [AID] 12 subfield is 4095, it may indicate that the Padding field starts in the trigger frame.” *Id.* Further, “[t]he

Padding field may be optionally provided” and “extends the length of the trigger frame.” *Id.* ¶ 139.

2. Prior Art Status of Kim / Entitlement of the '171 Patent to Earlier Effective Filing Date

Petitioner contends “that the Critical Date of the '171 Patent is **no earlier than Jan. 11, 2021**—the filing date of the '171 Patent—because the priority applications of the '171 Patent fail to provide written description support for the claimed invention, as required by 35 U.S.C. §§ 112(a), 119(a), and 120.” Pet. 5. According to Petitioner, “[t]here is no disclosure establishing that the inventors were in possession of a frame structure in which the AID field is set to a value related to a first padding field, when the first padding field is included in the frame,” as required by the limitations of independent claims 1 and 9. Pet. 7 (citing Ex. 1003 ¶ 62); *see* Pet. 9–10 (citing Ex. 1003 ¶ 66). Petitioner also asserts that the dependent claims also lack written description support. *See* Pet. 9–11. According to Petitioner, “[b]ecause every claim of the '171 Patent depends on features that lack written description support in the pre-Jan. 11, 2021 applications, none are entitled to an earlier filing date.” Pet. 11–12 (Ex. 1001, claims 1–16; Ex. 1003 ¶ 72; *Falko-Gunter Falkner v. Inglis*, 448 F.3d 1357 (Fed. Cir. 2006)). Petitioner asserts that Kim pre-dates January 11, 2021, and, therefore, is prior art. *See* Pet. 12.

In support of its arguments, Petitioner points to Korean Application No. 10-2015-0036754 (Exs. 1007, 1008; “KR '754”) as representative of disclosure of the priority applications. *See* Pet. 7. Petitioner asserts that KR '754 discloses using bits B0-B10 for AID values and B11 as a flag to distinguish between a general acknowledgement (ACK) and a batch acknowledgement (BA). *See id.* (citing Ex. 1003 ¶¶ 63–64; Exs. 1007, 1008

¶ 64, Fig. 9); *see also* Pet. 8 (reproducing Ex. 1007, Fig. 9 (with Petitioner’s annotations added)). Petitioner contends that the KR ’754 disclosure of using bits for AID values pertains to uplink acknowledgements, and does not relate to trigger frames or identify or relate to padding. *See* Pet. 7–8 (citing Ex. 1003 ¶¶ 63–64). Petitioner further asserts that although KR ’754 discloses that the padding method for length alignment of the AID field in the BA can be similarly applied in the downlink-OFDMA trigger process, “this only refers to inserting zero padding or repeating AIDs in the **downlink** transmission.” Pet. 7–8 (citing Ex. 1003 ¶¶ 63–64; Exs. 1007, 1008 ¶ 72).

Patent Owner disputes Petitioner’s contentions and contends that “Kim is not prior art to the ’171 Patent because its earliest effective date occurs after the priority date of the claims of the ’171 Patent.” Prelim. Resp. 5. According to Patent Owner, “[u]nder a reasonable reading of the applications to which the ’171 Patent claims priority, a POSITA would understand that the inventors of the ’171 Patent were in possession of the challenged claims [] no later than March 4, 2016, the filing date of PCT application number PCT/KR2016/0021[99].”⁷ Prelim. Resp. 6.

Patent Owner contends that PCT/KR2016/02199 (Ex. 1012, “PCT ’199”) filed on March 4, 2016 teaches the use of padding uplink data in order to ensure multi-user upstream transmissions terminate at the same time, and teaches a frame alignment technique which adds padding to a trigger frame based on AID information. *See* Prelim. Resp. 15–17

⁷Patent Owner incorrectly listed PCT/KR2016/002166 instead of PCT/KR2016/002199.

(reproducing Ex. 1012, Fig. 20; citing Ex. 1012 ¶¶ 17–21, 134–137).

According to Patent Owner,

[a] POSITA would plainly understand these disclosures to show that the inventors possessed “a frame structure in which the AID field is set to a value related to a first padding field, when the first padding field is included in the frame.” The “preset padding” disclosed in PCT ’199 includes “redundant AID information may be inserted prior to the FCS field of the trigger frame”—this maps cleanly, and directly, onto the ’171 Patent limitation at issue here for written description purposes.

Id. at 17. Patent Owner also directs its arguments to KR ’754 in response to Petitioner’s arguments addressing KR ’754, and asserts that Figures 10–12 and paragraphs 65–74 fully disclose claims 1 and 9 of the ’171 Patent, including the AID field limitation disputed by Petitioner. *See* Prelim. Resp. 8–14 (reproducing Ex. 1007, Figs. 10–12; citing Ex. 1008 ¶¶ 65–74).

Patent Owner further faults the Petition for not addressing the disclosures from PCT ’199 and KR ’754 that were addressed by Patent Owner, and for failing to provide argument or analysis to address the requisite factors for resolving a written description dispute. *See* Prelim. Resp. 18–19. According to Patent Owner “[h]aving failed to present evidence on the relevant disclosures in the record or the requisite legal argument, the Petition failed to establish the ’171 Patent was not entitled to any of the priority dates predating Kim’s earliest possible effective date.” *Id.* at 19.

Petitioner meets its initial burden of production by arguing that Kim is prior art (*see* Pet. 5–12), and, thereby, shifts the burden of production to Patent Owner to show that Kim is not prior art. Patent Owner can show Kim is not prior art by producing evidence to show entitlement of the challenged claims to a filing date earlier than Kim. *See Dynamic Drinkware, LLC v.*

Nat'l Graphics, Inc., 800 F.3d 1375, 1379–80 (Fed. Cir. 2015); *Research Corp. Techs., Inc. v. Microsoft Corp.*, 627 F.3d 859, 870–71 (Fed. Cir. 2010). For a claim in a later-filed application to be entitled to the filing date of an earlier application, the earlier application must provide written description support for the claimed subject matter. *Anascape, Ltd. v. Nintendo of Am. Inc.*, 601 F.3d 1333, 1337 (Fed. Cir. 2010). To satisfy the written description requirement, “a prior application itself must describe an invention, and do so in sufficient detail that one skilled in the art can clearly conclude that the inventor invented the claimed invention as of the filing date sought.” *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997); *see also VasCath v. Mahurkar*, 935 F.2d 1555, 1563–64 (Fed. Cir. 1991) (“[T]he applicant must [] convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention . . . now claimed.”), *Ariad Pharm. Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1352 (Fed. Cir. 2010) (en banc) (“[I]t is the specification itself that must demonstrate possession.”).

On the record before us, we do not agree that the '171 Patent is entitled to a filing date earlier than Jan. 11, 2021. In particular, we do not agree that PCT '199 describes the invention in enough detail such that a person of ordinary skill in the art could conclude that the inventor was in possession of the invention as of the March 4, 2016 filing date. The disclosures of PCT '199 cited by Patent Owner to show written description support show: (1) transmission packets for multi-user uplink data, which includes padding such that multi-user upstream data transfers from each resource terminate at the same time (*see* Ex. 1012 ¶¶ 17–21); (2) performing padding on a trigger frame that triggers multi-user simultaneous transmission, where the trigger frame includes AID information of the

stations assigned to each channel (*see* Ex. 1012 ¶¶ 134–135, Fig. 20); (3) performing preset padding before the FCS field of the trigger frame according to one embodiment (*see* Ex. 1012 ¶ 136, Fig. 20); and (4) inserting redundant AID information prior to the FCS field of the trigger frame, according to another embodiment (*see* Ex. 1012 ¶ 136, Fig. 20). PCT '199 does not describe the invention in enough detail to enable a person of ordinary skill in the art to conclude that the inventor possessed a frame for allocating resource for uplink (UL) multi-user (MU) transmission to one or more terminals that includes the AID field set to a value related to a first padding field, when the padding field is included in the frame. In particular, we discern no disclosure that conveys that the inventor possessed the following: (1) an AID field for the MU UL resource allocation frame is set to a value, (2) that the AID field is set to a value related to the padding field, and (3) that the AID field is set to a value related to the padding field, and conditioned on the inclusion of the AID field in the frame. Moreover, to the extent that Patent Owner's assertions are premised on the PCT '199's disclosure of a preset padding being performed before the FCS field of the trigger frame and the disclosure of inserting redundant AID information prior to the FCS field of the trigger frame, we note that these disclosures are directed to two embodiments. *See* Ex. 1012 ¶ 136, Fig. 20. PCT '199 does not provide any suggestion that the two embodiments are used together, or that the redundant AID information of one embodiment can serve as a preset padding of the other embodiment.

On the record before us, we also do not agree that KR '754 describes the invention in enough detail such that a person of ordinary skill in the art could conclude that the inventor was in possession of the invention as of the March 17, 2015 filing date of KR '754. The disclosures of KR '754 cited by

Patent Owner to show written description support show: (1) multiplexed group acknowledgment (ACK) transmitted from an access point (AP) to terminals over respective channels, (*see* Ex. 1008 ¶¶ 65–66, Fig. 10); (2) differing the number of AID values in the batch acknowledgment (BA) information field when the number of terminals assigned to each channel differs, setting the length of each multiplexed group ACK differently, and, if necessary, aligning the lengths of the multiplexed group ACKs based on the channel with the longest assigned BA information by adding zero padding or repeatedly inserting BA information (*see* Ex. 1008 ¶¶ 66–70, Fig. 11); and (3) applying the use of the AID field padding and the use of BA padding in a downlink OFDMA trigger process during multi-user downlink transmission to align the length of the trigger when the AP notifies the terminals assigned to each channel by inserting zero padding or repeating AIDs (*see* Ex. 1008 ¶¶ 71–72, Figs. 11–12). KR ’754 does not describe the invention in enough detail to enable a person of ordinary skill in the art to conclude that the inventor possessed a frame for allocating resource for uplink (UL) multi-user (MU) transmission to one or more terminals that includes an AID field set to a value related to a first padding field, when the padding field is included in the frame. In particular, we do not discern disclosure in KR’ 754 that conveys that the inventor possessed the following: (1) an AID field for the MU UL resource allocation frame is set to a value, (2) that the AID field is set to a value related to the padding field, and (3) that the AID field is set to a value related to the padding field, and conditioned on the inclusion of the AID field in the frame. We find misplaced Patent Owner’s argument that “KR ’754’s discussion about Figure 10 and Figure 11 would have been understood [by a POSITA] as disclosing a padding method used to improve predictability and consistency of uplink transmissions for when uplink

transmissions are scheduled by a trigger frame” (Prelim. Resp. 12–13) because: (1) it addresses uplink transmissions and not a frame for allocating resource for uplink (UL) multi-user (MU) transmission (i.e., UL MU trigger frame); (2) it does not address setting the AID field to a value related to the padding field when the padding field is included; and (3) it is unsupported attorney argument regarding the understanding of a person of ordinary skill in the art. Argument of counsel cannot take the place of objective evidence. *See Gemtron Corp. v. Saint-Gobain Corp.*, 572 F.3d 1371, 1380 (Fed. Cir. 2009). We also find misplaced Patent Owner’s argument that “the padding discussed by KR ’754 for its Figure 12 embodiment is not limited to downlink transmission but would have been understood by a POSITA as also being used to schedule uplink ones” (Prelim Resp. 14) because: (1) KR ’754 does not provide any suggestion that the same technique can be used for uplink transmission trigger frames; (2) Patent Owner’s argument does not address setting the AID field to a value related to the padding field when the padding field is included; and (3) Patent Owner’s argument is unsupported attorney argument regarding the understanding of a person of ordinary skill in the art. *See Gemtron*, 572 F.3d at 1380.

For the foregoing reasons and based on this record, for the purpose of institution, we find that the ’171 Patent is not entitled to an earlier effective filing date and find that Kim is prior art. In further briefing, the parties should address the respective burdens of production and persuasion for establishing that the ’171 Patent is entitled to an earlier effective filing date, and, if necessary, if Kim is entitled to an earlier effective filing date.

3. Analysis of Claim 1

For the reasons that follow, we are persuaded that Petitioner establishes sufficiently for the purpose of institution that Kim discloses, teaches, or suggests all of the limitations recited in claim 1.

Petitioner asserts that Kim discloses, teaches, or suggests “[a] wireless communication terminal . . . comprising: a transceiver; a processor . . . configured to: receive a frame for allocating resource for uplink (UL) multi-user (MU) transmission to one or more terminals,” based on Kim’s disclosure of a station (STA) including a physical layer interface between a Media Access Control (MAC) layer and a wireless medium, a transceiver implemented in a physical layer of IEEE 802.11/3GPP, and a processor that can perform a UL MU scheduling procedure including receiving and responding to a trigger frame that includes resource unit (RU) allocations in the User Information field. *See* Pet. 14–21 (reproducing Ex. 1015, Figs. 1, 16, 17(a), 17(c) 18, 26 (Petitioner’s annotations added); citing Ex. 1003 ¶¶ 77–83; Ex. 1015 ¶¶ 44, 127, 131–133, 138, 237). Petitioner contends that Kim discloses, teaches, or suggests “the frame includes an association identifier (AID) field and a frame check sequence (FCS) field; wherein the AID field is set to a value related to a first padding field, when the first padding field is included in the frame,” based on Kim’s disclosure of a trigger frame that includes an Frame Check sequence Field and a User Info field that includes an AID 12 subfield, and disclosure that when the AID 12 subfield is 4095, it may indicate the padding field starts in the trigger frame. *See* Pet. 21–23 (reproducing Ex. 1015, Figs. 17(a)–17(c) (Petitioner’s annotations added); citing Ex. 1003 ¶¶ 85–89; Ex. 1015 ¶¶ 136, 138, 139, 143). Petitioner further asserts that Kim discloses, teaches, or suggests “the first padding field is used to adjust a length of the frame; wherein the first

padding field is related to a preparation of a response frame for the frame, and transmit the response frame in response to the frame,” based on Kim’s disclosure that “[t]he padding bits may be used to adjust the length of the data field to a predetermined unit,” and “extends the length of the trigger frame so that a recipient STA may be allowed to prepare for an SIFS response after receipt of the trigger frame,” and “[t]he STAs may transmit a UL data frame . . . after SIFS from a PPDU including the trigger frame.” Pet. 23–25 (reproducing Ex. 1015, Fig 16 (Petitioner’s annotations added); citing Ex. 1003 ¶¶ 88–94; Ex. 1015 ¶¶ 133, 139).

Patent Owner does not address the merits of Petitioner’s patentability challenge based on Kim. *See* Prelim. Resp. 5–18. In any event, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. At this stage of the proceeding, we determine Petitioner shows sufficiently that Kim discloses, teaches, or suggests all of the limitations of claim 1.

For all of the foregoing reasons, for the purpose of institution and based on the record before us, Petitioner establishes sufficiently that the subject matter of claim 1 would have been obvious over Kim.

4. Analysis of Independent Claim 9

Independent claim 9 is a method claim similar in scope to claim 1. *Compare* Ex. 1001, 22:16–32, *with id.* at 22:59–67. Petitioner’s arguments addressing independent claim 9 rely on its arguments addressing claim 1. *See* Pet. 37. Patent Owner does not address the merits of Petitioner’s patentability challenge based on Kim. *See* Prelim. Resp. 5–18. Nevertheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. At this stage of

the proceeding, for the same reasons as those explained above addressing claim 1, we determine Petitioner shows sufficiently that Kim discloses, teaches, or suggests all of the limitations of claim 9.

For the purpose of institution and based on the record before us, and including the reasons explained above addressing claim 1, Petitioner establishes sufficiently that the subject matter of claim 9 would have been obvious over Kim.

5. Analysis of Dependent Claims 2–8 and 10–16

Claims 2–8 and 10–16 depend respectively from claims 1 and 9. *See* Ex. 1001, 22:16–23:30. We have reviewed Petitioner’s contentions and cited supporting evidence addressing how Kim discloses, teaches, or suggests the additional limitations of dependent claims 2–8 and 10–16 and find that, at this stage of the proceeding, Petitioner shows sufficiently that Kim discloses, teaches, or suggests all of the limitations of dependent claims 2–8 and 10–16. *See* Pet. 25–37.

For the purpose of institution and based on the record before us, including the reasons explained above addressing claims 1 and 9, Petitioner establishes sufficiently that the subject matter of claims 2–8 and 10–16 would have been obvious over Kim.

6. Summary

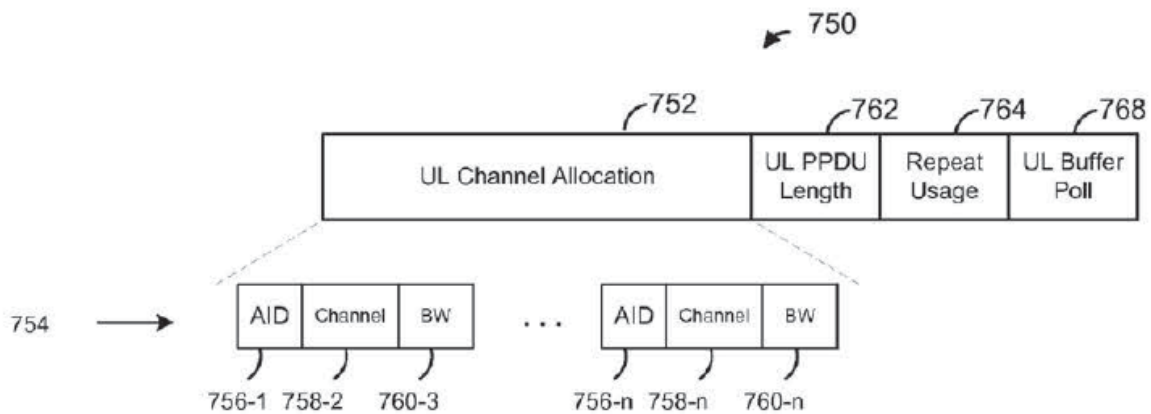
For all of the foregoing reasons and based on the record before us, we determine there is a reasonable likelihood Petitioner would prevail in showing that claims 1–16 are unpatentable under 35 U.S.C. § 103 over Kim.

F. Challenge to Claims 1–16 over Chu and Choi

1. Overview of Chu (Ex. 1016)

Chu is directed to embodiments in which “a wireless network device such as an access point (AP) of a wireless local area network (WLAN) simultaneously transmits independent data streams to multiple client stations and/or receives independent data streams simultaneously transmitted by multiple client stations.” Ex. 1016 ¶ 42. Specifically, “the AP transmits data for the multiple clients in different orthogonal frequency division multiplexing (OFDM) sub-channels of an orthogonal frequency division multiple access (OFDMA) transmission,” and the “multiple client stations transmit data to the AP simultaneously,” with each client station transmitting “in a different OFDM sub-channel of an OFDMA transmission.” *Id.*

Figure 7B is reproduced below.



As depicted in Figure 7B, an exemplary “OFDMA uplink scheduling element 750 includes a channel allocation field 752 which, in turn, includes a plurality of user fields 754.” Ex. 1016 ¶ 79. Chu discloses that “each user field 754 includes a station identifier subfield 756,” which is labeled as an “AID” in Figure 7B. *Id.* In operation, Chu describes that an AP transmits a scheduling frame, including, for example, scheduling element 750, to multiple client stations so as to provide “OFDMA uplink scheduling

information to be used for transmission of an uplink OFDMA data unit.” *Id.* ¶ 90.

2. Overview of Choi (Ex. 1017)

Choi is directed to “receiving a Traffic Indication Map (TIM) element by a Station (STA) in a Wireless Local Area Network (WLAN) system[, which] includes receiving a frame including a TIM element from an Access Point (AP), and decoding a partial virtual bitmap included in the TIM element.” Ex. 1017 ¶ 7. Choi discloses that “an STA may determine whether there is a data frame to be transmitted to the STA by STA identification information included in a TIM element,” where “STA identification information may be information related to an AID which is allocated to an STA when the STA is associated with an AP.” *Id.* ¶ 152. Choi notes, however, that in machine-to-machine (M2M) applications in which many STAs may be associated with an AP, “[i]f the conventional TIM structure is extended without any change, a TIM bitmap gets too large in size.” *Id.* ¶ 154. Accordingly, Choi discloses, “there is a need for a method for efficiently compressing a bitmap.” *Id.*

Choi describes an AID Differential Encode (ADE) mode for configuring a partial virtual bitmap in which a Block Control field of a TIM element may include “consecutive bits of AID differential values (Δ AID), Δ AID₁, Δ AID₂, . . . , Δ AID_m, and padding bits.” Ex. 1017 ¶ 181. More specifically, “[t]he ADE mode refers to a mode in which if m AIDs of m paged STAs are arranged in an ascending order, that is, AID₁, AID₂, . . . , AID_m, the AIDs are encoded/compressed using the differential values between the AIDs.” *Id.* ¶ 183. In an embodiment, “[t]he Δ AID field set to the value indicating the termination state (including following bits, if the

following bits exist) corresponds to padding bits following ΔAID_1 , ΔAID_2 , . . . , ΔAID_m indicating actual ΔAID values. In other words, a padding bit having a specific value may indicate the end of ΔAIDs .” *Id.* ¶ 214.

3. Analysis of Claim 1

For the reasons that follow, we are persuaded that Petitioner establishes sufficiently for the purpose of institution that the combination of Chu and Choi discloses, teaches, or suggests all of the limitations recited in claim 1.

Petitioner asserts that Chu discloses, teaches, or suggests “[a] wireless communication terminal . . . comprising: a transceiver; a processor,” based on Chu’s disclosure of client stations configured to operate according to high efficiency WLAN (HEW) communication protocol and interact with an access point (AP) using HEW, and including a physical layer (PHY) processing unit comprising a plurality of transceivers coupled to antennas, and a host processor coupled to a network interface. *See* Pet. 44–49 (reproducing Ex. 1016, Figs. 1, 9A (Petitioner’s annotations added); citing Ex. 1003 ¶¶ 117–121; Ex. 1016 ¶¶ 43, 44, 47, 90–94). Petitioner contends that Chu discloses, teaches, or suggests “the processor is configured to: receive a frame for allocating resource for uplink (UL) multi-user (MU) transmission to one or more terminals; wherein the frame includes an association identifier (AID) field and a frame check sequence (FCS) field,” based on Chu’s disclosure of an uplink scheduling frame that indicates respective channels allocated for uplink by client stations and that includes an uplink scheduling element including a station identifier subfield (AID) for a corresponding client station, and disclosure that a control frame, which includes an uplink scheduling frame, includes a FCS sub-field. *See*

Pet. 49–52 (reproducing Ex. 1016, Figs. 7B, 13B (Petitioner’s annotations added); citing Ex. 1003 ¶¶ 123–127; Ex. 1016 ¶¶ 76, 79, 90–92, 94, 118).

Petitioner asserts that Chu discloses, teaches, or suggests “the first padding field is used to adjust a length of the frame, and wherein the first padding field is related to a preparation of a response frame for the frame,” based on Chu’s disclosure that the scheduling frame includes one or more padding bits at the end of the scheduling frame to provide sufficient time for client stations to prepare for uplink transmission of an OFDMA data unit. *See* Pet. 56 (citing Ex. 1003 ¶ 161; Ex. 1016 ¶ 93), 58–59 (citing Ex. 1003 ¶¶ 167–168; Ex. 1016 ¶¶ 90, 92, 93). Petitioner directs attention to additional disclosure that the MAC header of the scheduling frame indicates the length of the valid payload that is followed by one or more padding bits and a signal field of PHY preamble of the scheduling frame indicates the entire length of the scheduling frame, including the one or more padding bits. *See id.* (citing Ex. 1016 ¶ 93). According to Petitioner, “[t]hese disclosures confirm that padding bits are deliberately used to increase and thereby modify the total length of the frame, and that this adjusted length is reflected in the PHY layer signaling.” *Id.* at 56–57 (citing Ex. 1003 ¶¶ 162–163). Petitioner further contends that Chu discloses, teaches or suggests “the processor is configured to: . . . transmit the response frame in response to the frame,” based on Chu’s disclosure of the AP transmitting an uplink scheduling frame to a plurality of client stations during time t1, and, during time t2, the plurality of client stations transmit respective OFDMA data units that collectively form an OFDMA data unit to the AP. *See* Pet. 61–63 (reproducing Ex. 1016, Fig. 9A (with Petitioner’s annotations added); citing Ex. 1003 ¶¶ 128–133; Ex. 1016 ¶¶ 90, 93).

To address the limitation “the AID field is set to a value related to a first padding field, when the first padding field is included in the frame,” Petitioner asserts that Chu discloses that padding may be included in the scheduling frame to provide client stations sufficient time to decode the frame and prepare for uplink transmission. *See* Pet. 52–53 (citing Ex. 1003 ¶ 153; Ex. 1016 ¶¶ 42, 90, 93; Pet. 40–44). Petitioner, acknowledges that although “Chu discusses the use of padding, it does not teach which field within the frame is used to indicate the presence of that padding.” Pet. 53 citing Ex. 1003 ¶ 153; Pet. 40–44; *see* Pet. 41.

Petitioner asserts that “Choi teaches a padding signaling mechanism that relies on a designated value within the AID field—specifically, a Δ AID field—to indicate the start of padding.” Pet. 53 (citing Ex. 1003 ¶ 154; Ex. 1017 ¶¶ 214, 231); *see id.* at 42 (citing Ex. 1003 ¶ 146; Ex. 1017 ¶¶ 7, 214, 231). Petitioner contends that the Δ AID field “is functionally and structurally derived from the AID space and is interpreted by the receiving device as part of the overall AID processing logic.” Pet. 53 (citing Ex. 1003 ¶ 153). According to Petitioner, “[a] POSITA would understand that this Δ AID field operates within a broader AID structure and, despite being encoded in a compressed format, it still constitutes a part of the AID field for signaling purposes.” *Id.* (citing Ex. 1003 ¶ 155). Petitioner further relies on Choi for teaching that, when the Δ AID field is set to a particular termination value, it signals that all subsequent bits in the bitmap are padding. *See* Pet. 42 (citing Ex. 1003 ¶ 146; Ex. 1017 ¶¶ 7, 213, 214), 53 (citing Ex. 1003 ¶ 154; Ex. 1017 ¶¶ 213–214, Fig. 22 (element 11), Fig. 23 (element 00)), 53–54 (citing Ex. 1003 ¶ 156). According to Petitioner, “[t]his allows the receiver to distinguish meaningful data from padding, simplifying frame parsing and ensuring proper interpretation.” Pet. 42 (citing Ex. 1003 ¶ 146).

Petitioner asserts that “Choi emphasizes the importance of such signaling for managing frame alignment and decoding, particularly in systems with variable-length fields.” *Id.* (citing Ex. 1003 ¶ 146; Ex. 1017 ¶¶ 5, 24, 231, 239).

Petitioner asserts that “[b]oth Chu and Choi recognize the utility of padding to manage timing, synchronization and processing overhead. Chu uses padding to give client stations sufficient time to prepare for uplink transmission, while Choi highlights padding as a tool for maintaining octet alignment and supporting reliable decoding.” Pet. 42 (citing Ex. 1003 ¶ 147; Ex. 1016 ¶ 93; Ex. 1017 ¶¶ 24, 184). According to Petitioner, “[a] POSITA would have been motivated to incorporate Choi’s efficient, value-based signaling method into Chu’s scheduling frame to allow client stations to easily determine where valid user allocation data ends and padding begins,” which would provide the benefits of “improv[ing] synchronization, reduc[ing] ambiguity, and enhanc[ing] reliability.” Pet. 54 (citing Ex. 1003 ¶ 157); *see* Pet. 43 (listing exemplary predictable benefits of improved parsing efficiency, enhanced synchronization, and reduced likelihood of misinterpreting padding as data).

In response, Patent Owner contends that Choi’s Δ AID is not conceptually the same as the AID field in a PPDU. *See* Prelim. Resp. 22. Patent Owner asserts that an AID in a PPDU in the ’171 Patent refers to an association ID included within a frame holding a terminal’s identification information and is a unique value assigned by an access point to terminals. *See id.* Patent Owner asserts that, in contrast, Choi’s Δ AID is a numerical difference between consecutive AIDs of terminals in a bitmap. *See id.* (citing Ex. 1017 ¶¶ 216, 219). Patent Owner further disputes Petitioner’s assertion that a POSITA would understand the Δ AID field operates within a

broader AID structure and constitutes a part of the AID field for signaling, contending that “[t]he Δ AID value is not an AID value at all,” and “is fundamentally different from the AID claimed in the ’171 Patent and known in the art.” *See id.* at 23 (citing Pet. 53). According to Patent Owner, “a POSITA would not understand that the ‘AID’ includes something like Choi’s Δ AID field.” *Id.*

We do not agree with Patent Owner’s arguments because they are not commensurate in scope with the claims. Claim 1 does not recite an AID field in a PPDU. In addition, we give little weight to Patent Owner’s unsupported attorney argument regarding the understanding of a POSITA. Argument of counsel cannot take the place of objective evidence. *See Gemtron*, 572 F.3d at 1380.

Patent Owner argues that Petitioner’s combination of Chu and Choi is incorrect and unsupported by the evidence because Choi does not disclose the use of an AID as part of a frame for scheduling an uplink transmission. *See* Prelim. Resp. 21. Patent Owner contends that Choi’s disclosure relates to AIDs transmitted via a control frame broadcast as a Traffic Indication Map (TIM) element used by APs to inform terminals that data is available for retrieval. *See id.* According to Patent Owner,

The Petition neither acknowledges nor explains why a POSITA, starting with the Chu’s “uplink scheduling frame,” would look to Choi’s TIM broadcast element for inspiration to improve Chu’s teachings. This is a serious deficiency, because, in Choi, there is no need to adjust the length through padding in preparation for uplink transmission

Id.

We do not agree with Patent Owner’s arguments because they are premised on Choi’s teachings as limited to AIDs transmitted via a control

frame broadcast as a TIM element. A prior art “reference must be considered for everything it teaches by way of technology and is not limited to the particular invention it is describing and attempting to protect.” *EWP Corp. v. Reliance Universal Inc.*, 755 F.2d 898, 907 (Fed. Cir. 1985) (emphasis omitted). For similar reasons, we also do not agree with Patent Owner’s arguments disputing Petitioner’s showing for the limitation “the first padding field is used to adjust a length of the frame,” on the basis that Chu and Cho are directed to functionally and logically different frame types. *See* Prelim. Resp. 23–24 (citing Ex. 1016 ¶ 93, Fig. 7B).

For the purpose of institution and based on Petitioner’s citations to Chu, Choi, and the testimony of Dr. Ding (Ex. 1003), we are persuaded Petitioner sets forth sufficient articulated reasoning with rational underpinning to support the conclusion that it would have been obvious to a person of ordinary skill in the art to combine Choi’s value-based signaling method with Chu’s scheduling frame to enable easy determination where valid user allocation data ends and padding begins with the benefits of improving synchronization, reducing ambiguity, and enhancing reliability. *See* Pet. 54 (citing Ex. 1003 ¶ 157); *KSR*, 550 U.S. at 418.

For all of the foregoing reasons, for the purpose of institution and based on the record before us, Petitioner establishes sufficiently that the subject matter of claim 1 would have been obvious over Chu and Choi.

4. Analysis of Claims 2–16

Independent claim 9 is a method claim similar in scope to claim 1, and claims 2–8, and 10–16 depend respectively from claims 1 and 9. *See* Ex. 1001, 22:16–23:30. Petitioner’s arguments addressing independent claim 9 rely on its arguments addressing claim 1. *See* Pet. 80. Patent Owner

does not address the merits of Petitioner's patentability challenge based on Chu and Choi on the basis of the limitations of claims 2–16 apart from the limitations of claim 1. *See* Prelim. Resp. 19–24. In any event, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

For the same reasons as those explained above addressing claim 1, we determine Petitioner shows sufficiently that the combination of Chu and Choi discloses, teaches, or suggests all of the limitations of claim 9. We have reviewed Petitioner's contentions and cited supporting evidence addressing how the combination of Chu and Choi discloses, teaches, or suggests the additional limitations of dependent claims 2–8 and 10–16 and find that, at this stage of the proceeding, Petitioner shows sufficiently that the combination of Chu and Choi discloses, teaches, or suggests all of the limitations of dependent claims 2–8 and 10–16. *See* Pet. 64–81.

For the purpose of institution and based on the record before us, including the reasons explained above addressing claim 1, Petitioner establishes sufficiently that the subject matter of claims 2–16 would have been obvious over the combination of Chu and Choi.

5. Summary

For all of the foregoing reasons and based on the record before us, we determine there is a reasonable likelihood Petitioner would prevail in showing that claims 1–16 are unpatentable under 35 U.S.C. § 103 over Chu and Choi.

III. CONCLUSION

For the foregoing reasons, we determine there is a reasonable likelihood that Petitioner would prevail in showing at least one of the challenged claims of the '171 Patent is unpatentable.

IV. ORDER

In consideration of the foregoing, it is hereby

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–16 of the '171 Patent is instituted with respect to all grounds set forth in the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), *inter partes* review of the '171 Patent shall commence on the entry date of this Order, and notice is hereby given of the institution of a trial.

IPR2025-01110
Patent 11,716,171 B2

PETITIONER:

W. Karl Renner
Jeremy Monaldo
Jong Wan Suh
axf-ptab@fr.com
jjm@fr.com
suh@fr.com

PATENT OWNER:

Reza Mirzaie
Neil Rubin
Philip X Wang
Linjun Xu
rmirzaie@raklaw.com
nrubin@raklaw.com
pwang@raklaw.com
lxu@raklaw.com