

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.

IPR2025-01044
Patent 11,516,879 B2

Before KRISTEN L. DROESCH, TERRENCE W. McMILLIN, and
DANIEL J. GALLIGAN, *Administrative Patent Judges*.

GALLIGAN, *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 for *inter partes* review (Paper 2 (“Pet.” or “Petition”)) challenging claims 1–10 of U.S. Patent 11,516,879 B2 (Ex. 1001 (the “’879 patent”)). Wilus Institute of Standards and Technology Inc. (“Patent Owner”) filed a Preliminary Response. Paper 10 (“Prelim. Resp.”).

This Petition has been referred to the Board to determine whether to institute review. Paper 11. The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted unless the information presented in the Petition and the Preliminary Response shows “there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.”

For the reasons explained below, we institute an *inter partes* review of all challenged claims on all grounds raised in the Petition.

B. Related Matters

As required by 37 C.F.R. § 42.8(b)(2), the parties identify various related matters. Pet. 97; Paper 4 at 1–2; Paper 7 at 1–2.

C. Real Parties in Interest

Petitioner identifies itself and Samsung Electronics America, Inc. as the real parties in interest. Pet. 97. Patent Owner identifies itself as the real party in interest. Paper 4 at 1; Paper 7 at 1.

D. Illustrative Claim of the ’879 Patent

Claim 1 is reproduced below with Petitioner’s identifiers in brackets. *See* Pet. vi.

1. [1pre] A wireless communication terminal that wirelessly communicates with a base wireless communication terminal, the wireless communication terminal comprising:

[1.1] a transceiver; and a processor, wherein the processor is configured to:

[1.2] receive, from the base wireless communication terminal, a trigger frame using the transceiver, wherein the trigger frame triggers a orthogonal frequency division multiple access (OFDMA) uplink transmission of the wireless communication terminal,

[1.3] transmit, to the base wireless communication terminal, a trigger-based physical layer protocol data unit (PPDU) in response to the trigger frame using the transceiver,

[1.4] switch a parameter set, which is a set of parameters used for the channel access, from a first parameter set to a second parameter set based on whether the base wireless communication terminal triggers a multi-user uplink transmission participation of the wireless communication terminal,

[1.5] when a MAC protocol data unit (MPDU) included in the trigger-based PPDU does not request an immediate response, set a second parameter set timer for an access category of the MPDU when the transmission of the trigger-based PPDU ends,

[1.6] when the MPDU included in the trigger-based PPDU requests an immediate response, set the second parameter set timer for the access category of the MPDU for which immediate response is received,

[1.7] when the second parameter set timer expires, terminate an application of the second parameter set, and

[1.8] access a channel according to a priority of data to be transmitted to the base communication terminal by the wireless communication terminal and the parameter set.

E. Asserted Grounds of Unpatentability

Petitioner presents the following grounds (Pet. 1):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–3, 8–10	103 ¹	Zhou, ² Cherian, ³ Kim ⁴
4, 5	103	Zhou, Cherian, Kim, Ho ⁵
6, 7	103	Zhou, Cherian, Kim, Bharghavan ⁶

II. ANALYSIS

A. Principles of Law

A patent 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 also 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

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284 (2011), amended 35 U.S.C. §§ 102 and 103, effective March 16, 2013, which precedes the earliest priority date for the ’879 patent. Ex. 1001, code (30). Therefore, we apply AIA §§ 102 and 103.

² US 2017/0202023 A1, published July 13, 2017 (Ex. 1004), incorporating US Provisional Application No. 62/278,268 (Ex. 1005). In this Decision, we cite Exhibit 1005 for Zhou’s disclosures.

³ US 2017/0325264 A1, published Nov. 9, 2017 (Ex. 1006), incorporating US Provisional Application No. 62/333,745 (Ex. 1007). In this Decision, we cite Exhibit 1007 for Cherian’s disclosures.

⁴ US 2018/0034595 A1, published Feb. 1, 2018 (Ex. 1008).

⁵ US 2010/0195664 A1, published Aug. 5, 2010 (Ex. 1018).

⁶ US 9,197,482 B1, issued Nov. 24, 2015 (Ex. 1010).

matter and the prior art; (3) the level of ordinary skill in the art; and (4) any secondary considerations, if in evidence.⁷ *Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

Petitioner argues 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,” which we understand Petitioner identifies as September 7, 2016. Pet. 2, 4 (citing Ex. 1003 ¶¶ 26–28). Petitioner also contends that “[i]ncreased educational experience can make up for less work experience, and vice versa.” Pet. 4.

Patent Owner does not object to Petitioner’s definition at this stage. Prelim. Resp. 11.

To the extent necessary, and for purposes of this Decision, we accept the uncontested assessment offered by Petitioner, which appears consistent with the ’879 patent and the asserted prior art, except that we delete the qualifier “at least” to eliminate vagueness as to the amount of experience.

C. Claim Construction

The parties agree that no claim terms require express construction. Pet. 4; Prelim. Resp. 11. On this record, we determine that no terms need express construction. *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

⁷ Patent Owner has not introduced secondary considerations evidence.

the controversy.” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

*D. Alleged Unpatentability Based on the Combination of
Zhou, Cherian, and Kim
(Claims 1–3, 8–10)*

Petitioner asserts that claims 1–3 and 8–10 would have been obvious based on the combined teachings of Zhou, Cherian, and Kim. Pet. 1, 8–72. Patent Owner opposes. Prelim. Resp. 15–23.

1. Overview of the references

Zhou discloses selecting whether a station (STA) in a wireless system operates in a scheduled mode (e.g., in UL-MU (uplink multi-user)) using enhanced distributed channel access (EDCA) parameters or in a legacy mode, and Zhou discloses switching between such modes. Ex. 1005 ¶¶ 72–74, 79–81.

Cherian discloses switching between multi-user (MU) mode and single-user (SU) or legacy mode and discloses a timer to determine how long EDCA MU parameters should be used. Ex. 1007 ¶¶ 46, 63.

Kim discloses including data in a trigger frame indicating an acknowledgement (ACK) policy. Ex. 1008, code (57), ¶ 91.

Additional pertinent details of the references are discussed below.

2. Overview of Petitioner’s contentions for claim 1

For teaching the limitations of claim 1, Petitioner relies on Zhou’s disclosures of selecting different channel access parameters in combination with Cherian’s disclosures of transitioning between sets of parameters and Kim’s disclosures of ACK policies. Pet. 14–15.

More specifically, for the preamble of claim 1 (“A wireless communication terminal that wirelessly communicates with a base wireless

communication terminal, the wireless communication terminal comprising”), Petitioner argues that Zhou discloses wireless communication systems that allow multiple terminals to communicate with a base station. Pet. 20–22 (citing Ex. 1005 ¶¶ 1–4, 20–24, 31, Figs. 1, 2; Ex. 1003 ¶¶ 111–112); *see also* Pet. 22–23 (asserting that Cherian teaches the preamble).

Claim 1 recites that the wireless communication terminal comprises “a transceiver; and a processor, wherein the processor is configured to” (recitation 1.1) perform the operations in limitations 1.2–1.8. Petitioner argues that Zhou discloses wireless device 202 having processor 204 and transceiver 214. Pet. 23 (citing Ex. 1005 ¶¶ 37–38, 40, 45. Fig. 2 (block diagram of wireless device 202 with processor 204 and transceiver 214); Ex. 1003 ¶ 114); *see also* Pet. 23–24 (asserting that each of Cherian and Kim also teaches a wireless unit with a processor and a transceiver).

For limitation 1.2’s operation (“receive, from the base wireless communication terminal, a trigger frame using the transceiver, wherein the trigger frame triggers a orthogonal frequency division multiple access (OFDMA) uplink transmission of the wireless communication terminal”), Petitioner argues that Zhou discloses that an access point (AP) sends a trigger frame to the stations (STAs) (wireless communication devices), which triggers OFDMA transmissions. Pet. 25–28 (citing Ex. 1005 ¶¶ 41, 48–50, Fig. 1; Ex. 1003 ¶¶ 119–121); *see* Ex. 1005 ¶ 48 (“[T]he UL-MU signals 110c and 110d (e.g., UL-MU-MIMO or UL-OFDMA transmissions) may be based on a UL-MU trigger frame sent by the AP 104 to the STAs 106c and 106d.”).

For limitation 1.3’s operation (“transmit, to the base wireless communication terminal, a trigger-based physical layer protocol data unit (PPDU) in response to the trigger frame using the transceiver”), Petitioner

argues that Zhou discloses UL-MU transmissions between a wireless communication device (STA) and an AP in response to trigger frames. Pet. 31–35 (citing Ex. 1005 ¶¶ 27, 41, 47–50, 81; Ex. 1003 ¶¶ 126–134); *see* Ex. 1005 ¶¶ 48 (“[T]he UL-MU signals 110c and 110d (e.g., UL-MU-MIMO or UL-OFDMA transmissions) may be based on a UL-MU trigger frame sent by the AP 104 to the STAs 106c and 106d.”), 41 (“In some aspects, the data unit may comprise a physical layer convergence procedure (PLCP) protocol data unit (PPDU).”).

For limitation 1.4’s operation (“switch a parameter set, which is a set of parameters used for the channel access, from a first parameter set to a second parameter set based on whether the base wireless communication terminal triggers a multi-user uplink transmission participation of the wireless communication terminal”), Petitioner relies on the combined teachings of Zhou and Cherian. Pet. 35–39. In particular, Petitioner argues that Zhou discloses that access points can define EDCA parameters for particular stations and that Cherian discloses switching between parameter sets. Pet. 35–36 (citing Ex. 1005 ¶¶ 2, 10, 11, 43, 47, 50; Ex. 1007 ¶¶ 5, 58, 60, 65, Fig. 3; Ex. 1003 ¶¶ 135–136). Petitioner further argues that Cherian discloses that a trigger frame from a base station causes a wireless station to transition to a multi-user mode and, consequently, update its EDCA parameters. Pet. 39 (citing Ex. 1007 ¶¶ 47, 58, 65; Ex. 1003 ¶ 139); *see* Ex. 1007 ¶ 58 (“As shown in 400A, a trigger frame is transmitted by AP at 402 scheduling UL resources to stations STAI, STA2, and STA3 for simultaneous UL transmission. One or more of the STAs may be operating in a default SU mode before receiving the trigger frame from the AP. In response to receiving the trigger frame at 402, the STAs 1–3 transition to the

MU mode and, simultaneously transmit packets on the UL on resources scheduled by the trigger frame received at 402”).

Limitations 1.5 and 1.6 involve setting timers based on whether or not an “immediate response” is requested. Limitation 1.5 recites “when a MAC protocol data unit (MPDU) included in the trigger-based PPDU does not request an immediate response, set a second parameter set timer for an access category of the MPDU when the transmission of the trigger-based PPDU ends.” Limitation 1.6 recites “when the MPDU included in the trigger-based PPDU requests an immediate response, set the second parameter set timer for the access category of the MPDU for which immediate response is received.”

Petitioner argues that an ACK signal is an “immediate response” as recited in these limitations. Pet. 40. Petitioner notes that Cherian discloses a timer that controls how long the multi-user EDCA parameters are used by the STA and argues that Zhou includes various disclosures about when to reset a timer. Pet. 46 (citing Ex. 1007 ¶¶ 42, 58, 63, Fig. 5; Ex. 1005 ¶ 81). Petitioner also relies on Kim’s disclosures of setting various ACK policies for each station, including a “Normal ACK” when a response is required and a “No ACK” when no response is required. Pet. 41–45 (citing Ex. 1008 ¶¶ 60, 64–65, 91, 94–97, 107–109, Tables 1, 2, 6–9, Figs. 10, 12, 14–23). Petitioner argues that, based on these teachings, it would have been obvious to a person of ordinary skill in the art to set a timer when an ACK is received, as in limitation 1.6, or upon complete transmission when no ACK is requested, as in limitation 1.5, because “[a] STA measures the ‘completion’ of the transmission by receiving an ACK—if an ACK is requested—or upon completion of the physical transmission.” Pet. 55–56

(citing Ex. 1003 ¶ 161); *see also* Pet. 39–61 (detailed explanation for limitations 1.5 and 1.6).

For limitation 1.7’s operation (“when the second parameter set timer expires, terminate an application of the second parameter set”), Petitioner argues that Cherian discloses transitioning back to single user EDCA parameters when the timer expires. Pet. 61 (citing Ex. 1007 ¶¶ 49–50, 58, Fig. 4; Ex. 1003 ¶ 167); *see also* Pet. 62 (asserting that Zhou teaches transitioning from scheduled mode to legacy mode).

For limitation 1.8’s operation (“access a channel according to a priority of data to be transmitted to the base communication terminal by the wireless communication terminal and the parameter set”), Petitioner argues that the EDCA parameters taught by Zhou and Cherian enable access to a channel according to data priority. Pet. 62–63 (citing Ex. 1005 ¶¶ 2, 32; Ex. 1007 ¶¶ 42, 51; Ex. 1003 ¶¶ 170–171).

Petitioner also provides various reasons that a person of ordinary skill in the art would have combined the teachings of Zhou, Cherian, and Kim. Pet. 19–25.

3. Analysis of Patent Owner’s arguments

Patent Owner disputes Petitioner’s contentions for limitations 1.5 and 1.6. Prelim. Resp. 15–21.

a) Immediate response

Patent Owner argues that the “Petition fails to show that or explain how Kim’s reference to acknowledgements, [e.g., ‘normal acknowledgement’ and ‘no acknowledgement’ (Pet. at 42) constitutes the claimed immediate response.” Prelim. Resp. 17. On this record we disagree because the ’879 patent discloses that a request for an ACK is a request for an immediate response. For example, the ’879 patent discloses, with

reference to Figure 17, that “[t]he A-MPDU [(Aggregate-MAC Protocol Data Unit)] including the QoS data frame may be classified into the context of Data Enabled Immediate Response (DEIR) or Data Enabled No Immediate Response (DENIR) depending on whether QoS data requests an Ack.” Ex. 1001, 23:55–58. The ’879 patent further explains that when an ACK is requested, the immediate response context is set to DEIR, whereas it is DENIR when no ACK is requested. Ex. 1001, 23:59–24:44; *see also* Pet. 57–61 (discussing the A-MPDU disclosure of Figure 17 of the ’879 patent). Thus, on this record, we are sufficiently persuaded that Kim’s normal ACK and no ACK policies correspond, respectively, to when an immediate response is required and is not required. *See* Ex. 1008 ¶ 65 (Table 1) (disclosing that “[t]he BA Ack Policy subfield is set to [Normal Acknowledgment] when the sender requires immediate acknowledgment” and that “No Acknowledgment” means that [t]he addressee sends no immediate response upon receipt of the frame”).

Citing Petitioner’s argument that “a request for an immediate response is a design choice contemplated by Kim” (Pet. 43 (emphasis omitted)), Patent Owner argues that “[t]his is entirely conclusory and insufficient to establish a reasonable likelihood of unpatentability.” Prelim. Resp. 17. According to Patent Owner, “[n]owhere does Kim (or any other cited reference) discuss a request for an immediate response being a ‘design choice.’” Prelim. Resp. 17.

On this record, we disagree that Petitioner’s analysis is insufficient. Rather, Petitioner explains that Kim discloses an ACK policy that can be assigned per STA and has the following four possible options: “Normal ACK,” “No ACK,” “No explicit acknowledgement or PSMP ACK,” and “Block ACK.” Pet. 42–45 (citing Ex. 1008 ¶¶ 91, 94–96, Tables 6–9); *see*

Ex. 1008 ¶ 94 (“That is, the aforementioned ACK policy field may indicate four different values using 2 bits of information and the values are defined as shown in Tables 6 to 9.”). Thus, Kim expressly teaches multiple ACK policy options.

Patent Owner further argues that “[t]he Petition does not rely on any disclosure of Zhou or Cherian for the ‘immediate response’ requirement.” Prelim. Resp. 16. We do not agree with this statement because, although Petitioner cites Kim’s disclosure of signaling ACK policies, Petitioner also expressly relies on Zhou’s disclosure of resetting a timer after receiving an ACK for its contentions for limitations 1.5 and 1.6. *See* Pet. 46, 56.

b) Setting a timer

Patent Owner argues that Petitioner’s contentions regarding setting a timer fail because “[i]n Zhou, the ‘timer/counter’ is a parameter used to determine poor performance, not to determine whether a time interval for MU mode has expired.” Prelim. Resp. 19–20 (citing Ex. 1005 ¶ 79); *see also* Prelim. Resp. 22–23 (“Zhou’s timer/counter only relates to evaluating the STA’s performance in the scheduled EDCA mode. It is not a timer which establishes how long the scheduled mode EDCA parameters are valid.”). Zhou, however, expressly discloses that poor performance may cause the STA to revert to legacy mode from scheduled mode, and Zhou states that “poor performance can be determined by determining that the STA 106 (with buffered data) is not scheduled for UL transmission after ‘X’ seconds.” Ex. 1005 ¶ 79. Therefore, Zhou discloses a timer to determine when to transition back to legacy EDCA parameters. Ex. 1005 ¶ 79 (“In some aspects, a scheduled mode STA 106 may revert back to legacy mode EDCA parameters if selecting scheduled mode EDCA parameters gives poor performance.”). On this record, we do not view Zhou’s and Cherian’s timer

disclosures as “disparate teachings” (Prelim. Resp. 20); rather, both are directed to transitioning EDCA modes.

Patent Owner also argues that “Zhou does not contain any disclosure or suggestion about how to select the time point for resetting or zeroing a timer/counter among ‘transmits a scheduled UL transmission’ and ‘transmits a scheduled UL transmission and gets an ACK message.’” Prelim. Resp. 21 (citing Pet. 46). Patent Owner faults Petitioner’s assertion that Zhou “demonstrates various times at which the setting or resetting of a timer could have occurred” (Pet. 46), arguing that “[t]he reference to what ‘could have’ occurred undercuts the Petition’s obviousness theory and fails to show that a [person of ordinary skill in the art] *would be motivated* to combine the references to arrive at the claimed invention.” Prelim. Resp. 21.

On this record we do not agree with these arguments because Zhou expressly discloses multiple options for resetting the timer, including “after the STA 106 transmits a scheduled UL transmission, or transmits a scheduled UL transmission and gets an ACK message.” Ex. 1005 ¶ 81. We find sufficiently persuasive Petitioner’s explanation that “after” in Zhou means after the transmission ends if an ACK is not requested; in the case of an ACK, Zhou expressly discloses starting the timer after receiving the ACK. *See* Pet. 46–49. Petitioner’s declarant, Dr. Valenti, testifies that “[a] STA measures the ‘completion’ of the transmission by receiving an ACK—if an ACK is requested—or upon completion of the physical transmission.” Ex. 1003 ¶ 161 (citing Ex. 1018 ¶ 9). On this record, we find this testimony to be sufficiently credible based on the evidence cited. *See* Ex. 1018 ¶ 9 (“A successful transmission occurs when the node either receives an expected acknowledgment correctly, or transmits a frame that does not require an acknowledgement.”).

Patent Owner also argues that “there is no disclosure or suggestion in Kim of [using] the ACK policy as a criterion for setting a second EDCA parameter set timer.” Prelim. Resp. 17. On this record, we need not rely on such a teaching of Kim because we are sufficiently persuaded by Petitioner’s contentions with respect to Zhou’s teachings, as discussed in the previous paragraph. We note that Petitioner contends that “it would have been obvious for a [person of ordinary skill in the art] to try Kim’s method of *when to use* a timer.” Pet. 18. It is not clear that Petitioner’s overall contentions actually rely on Kim for a timer; rather, Petitioner relies on Kim’s “acknowledgement mechanism” (Pet. 17–18), which can be set per STA (Pet. 41–45).

c) Alleged reliance on different embodiments

Patent Owner argues that the Petition relies on different embodiments of Zhou, including ones that use EDCA parameters based on capability and another that “discusses termination based on legacy mode transmission results,” and that Petitioner does not “establish that a [person of ordinary skill in the art] would be [motivated to] modify Zhou’s different use of EDCA parameters to arrive at the claimed invention of the ’879 patent.” Prelim. Resp. 22 (citing Ex. 1005 ¶¶ 43, 50, 72, 73).

On this record, we do not understand Zhou’s cited teachings to be inconsistent, and Patent Owner does not provide substantive explanation explaining its position. Limitation 1.4 recites “switch[ing] a parameter set, which is a set of parameters used for the channel access, from a first parameter set to a second parameter set *based on whether the base wireless communication terminal triggers a multi-user uplink transmission participation of the wireless communication terminal*” (emphasis added). Petitioner argues that “[t]he selection in Zhou can be based on whether the

STA is capable of, and is called upon to participate in, UL-MU transmissions.” Pet. 36 (citing Ex. 1005 ¶¶ 43, 47, 50). On this record, we are sufficiently persuaded that Zhou teaches switching parameter sets based on signaling from a base station (AP). See Ex. 1005 ¶ 50 (“[T]he AP 104 may limit UL SU transmission by adjusting EDCA parameters for STAs capable of and willing for transmitting UL MU transmissions.”).

d) Determination for claim 1

For the reasons discussed above, we find Petitioner’s contentions sufficiently persuasive for limitations 1.5 and 1.6, and we are also persuaded by Petitioner’s contentions for the remaining limitations of claim 1, which Patent Owner does not presently dispute. On this record, we also find that Petitioner has presented sufficient articulated reasoning for combining the teachings of Zhou, Cherian, and Kim. Therefore, we determine that there is a reasonable likelihood that Petitioner would prevail with respect to at least claim 1.

III. CONCLUSION

For the foregoing reasons, we determine that the information presented in the Petition establishes that there is a reasonable likelihood that Petitioner would prevail in challenging at least one claim of the ’879 patent, and we institute *inter partes* review of all challenged claims on all grounds raised in the Petition. See 37 C.F.R. 42.108(a) (“When instituting *inter partes* review, the Board will authorize the review to proceed on all of the challenged claims and on all grounds of unpatentability asserted for each claim.”). At this stage of the proceeding, we have not made a final determination with respect to the patentability of any of the challenged claims or the construction of any claim term.

IV. ORDER

Accordingly, it is

ORDERED that, pursuant to 35 U.S.C. § 314(a) and 37 C.F.R. § 42.4, an *inter partes* review is hereby instituted as to claims 1–10 of the '879 patent on all challenges raised in the Petition; and

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

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