

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,
Petitioner,

v.

ASUS TECHNOLOGY LICENSING INC.,
Patent Owner.

IPR2024-00614
Patent 10,187,878 B2

Before JOSIAH C. COCKS, THOMAS L. GIANNETTI, and
BACH V. HOANG, *Administrative Patent Judges*.

HOANG, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. Background

Samsung Electronics Co., Ltd. (“Petitioner”) filed a Petition requesting an *inter partes* review challenging claims 1–28 of U.S. Patent No. 10,187,878 B2 (Ex. 1001, “the ’878 patent”). Paper 1 (“Pet.” or “Petition”). ASUS Technology Licensing Inc. (“Patent Owner”) timely filed a Preliminary Response. Paper 6 (“Prelim. Resp.”).¹

An *inter partes* review may not be instituted unless “the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a).

Having reviewed the parties’ papers and the evidence of record, we determine Petitioner has not shown a reasonable likelihood it will prevail in establishing the unpatentability of any of the challenged claims. Accordingly, we do not institute an *inter partes* review.

B. Real Parties in Interest

Petitioner identifies Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Research America as the real parties in interest. Pet. 1. Patent Owner identifies ASUS Technology

¹ Patent Owner filed a Motion to Seal with its Preliminary Response and a Protective Order which Patent Owner states is agreed on by the parties. Paper 7 (Motion to Seal); Ex. 2063 (Proposed Protective Order). We address the Motion to Seal in a separate, forthcoming Order. Furthermore, because this decision refers to material that is the subject of the Motion to Seal, the decision is designated as “Parties and Board Only.” The parties shall meet and confer to agree upon and jointly submit via an email to the Board a proposed redacted public version of this decision.

Licensing Inc. as the owner of the '878 patent and identifies Celerity IP, LLC as assisting in licensing the '878 patent. Paper 4 (Patent Owner's Mandatory Notices), 2.

C. Related Matters

The parties indicate that the '878 patent has been asserted in a district court lawsuit: *ASUS Technology Licensing Inc. et al. v. Samsung Elecs. Co. Ltd. et al.*, Case No. 2:23-cv-00409 (E.D. Tex.). Pet. 1; Paper 4, 2.

D. The Petition's Asserted Grounds

Petitioner asserts the following grounds of unpatentability:

Claims Challenged	35 U.S.C. ² §	References/Basis
1–28	103	Ekpenyong ³ , Huawei-374 ⁴ , Huawei-192 ⁵

² The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 285–88 (2011), revised 35 U.S.C. § 103 effective March 16, 2013. We apply the AIA version of § 103.

³ US 9,762,372 B2, filed June 15, 2011, issued September 12, 2017. Ex. 1004.

⁴ R2-153374, *Uplink latency reduction for synchronized UEs*, 3GPP TSG-RAN WG2 Meeting #91 (Aug. 14, 2015). Ex. 1005; *see* Ex. 1024 ¶¶ 54–58.

⁵ R2-154192, *Further analysis on uplink transmission skipping*, 3GPP TSG-RAN WG2 Meeting #91bis (Sept. 26, 2015). Ex. 1006; *see* Ex. 1024 ¶¶ 59–63.

Claims Challenged	35 U.S.C. ² §	References/Basis
1–28	103	Novlan ⁶ , TS-212 ⁷ , TS-213 ⁸ , Samsung-332 ⁹ , Samsung-333 ¹⁰

Pet. 3.

E. Testimonial Evidence

Petitioner relies on the proffered Declarant testimony of Harry V. Bims, Ph.D. (Ex. 1003) and Craig Bishop (Ex. 1024).

Patent Owner relies on the proffered Declarant testimony of Marwan M. Krunz. Ex. 2001.

⁶ U.S. Patent No. 10,129,782 B2, filed January 25, 2016, issued November 13, 2018. Ex. 1011. Novlan claims priority to provisional applications filed November 5, 2015, July 23, 2015, and January 30, 2015. *Id.* at (code 60).

⁷ 3GPP TS 36.212 V13.0.0 (2015-12) 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Multiplexing and channel coding (Release 13) (Jan. 5, 2016). Ex. 1009; *see* Ex. 1024 ¶¶ 74–80.

⁸ 3GPP TS 36.213 V12.5.0 (2015-03) 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures (Release 12) (Mar. 25, 2015). Ex. 1010; *see* Ex. 1024 ¶¶ 81–87.

⁹ R2-153332, *Skipping uplink transmission with no data to transmit*, 3GPP TSG-RAN WG2 Meeting #91 (Aug. 15, 2015). Ex. 1007; *see* Ex. 1024 ¶¶ 64–68.

¹⁰ R2-153333, *Change Request: Skipping uplink transmission with no data to transmit*, 3GPP TSG-RAN WG2 Meeting #91 (Aug. 14, 2015). Ex. 1008; *see* Ex. 1024 ¶¶ 69–73.

F. The '878 Patent (Ex. 1001)

The '878 Patent describes data transmission techniques for wireless communication systems, e.g., for Third Generation Partnership Project (“3GPP”)¹¹ Long Term Evolution (“LTE”) systems. Ex. 1001, 2:56–3:18. Relevant here, user equipment (“UE”), such as a wireless communication device, transmits wireless communications to a base station (“BS”), such as an evolved Node B (“eNB”). *Id.* at 3:53–60. Figure 1, reproduced below, shows a wireless communication system including a UE, e.g., access terminal 116, transmitting communication to base station 100 over communication link 118. *Id.* at 3:19–30, 5:8–10.

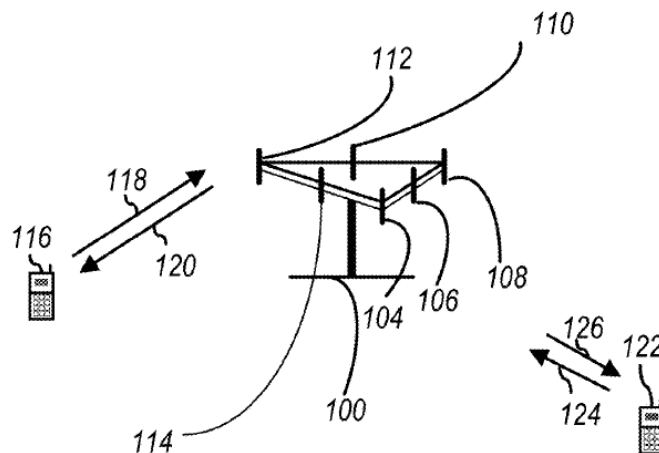


FIG. 1

Figure 1 is a diagram of a wireless communication system showing UEs, a base station, and communication links. Ex. 1001, 1:57–58.

A UE and base station communicate using one of two physical layer channels: a physical uplink shared channel (“PUSCH”) or a physical uplink control channel (“PUCCH”). *See id.* at 5:35–36, 15:40–55. The '878 patent

¹¹ 3GPP is an engineering organization that develops technical specifications. Ex. 2021, 5.

describes PUSCH as a data channel and PUCCH as a control channel.¹² *Id.* at 36:57–58, 40:32–33. The ’878 patent also distinguishes between “data,” e.g., data in the UE buffer, and physical control information (“PCI”), e.g., channel quality indicator (“CQI”), Precoding Matrix Index (“PMI”), Rank Indicator (“RI”), and/or Hybrid Automatic Repeat Request (“HARQ”) feedback.¹³ *See id.* at 6:33–34, 36:8–11. Although the ’878 patent states that PCI may be sent on either data channels or control channels (*id.* at 36:11–13), relevant here is the scenario in which the UE transmits PCI on a data channel (*id.* at 39:17–27).

Figure 31, reproduced below, illustrates the scenario where a UE is given an uplink grant in a transmission time interval (“TTI”) for a data channel, e.g., PUSCH, and transmits PCI over that data channel. *Id.* at 46:3–11; *see id.* at 8:52–54, 36:65–66, 39:17–21.

¹² Petitioner similarly distinguishes between “PUCCH (a control channel)” and “PUSCH (a data channel).” Pet. 9.

¹³ Based on the ’878 patent’s disclosure, we discuss “data” as distinct from “PCI.” This is consistent with both parties’ use of “data” and “PCI” distinctively. *See, e.g.*, Pet. 3 (“a UE received a UL grant to send data or control information to a BS”); Prelim. Resp. 25 (“transmit physical control information when the UE has no data available for transmission.”).

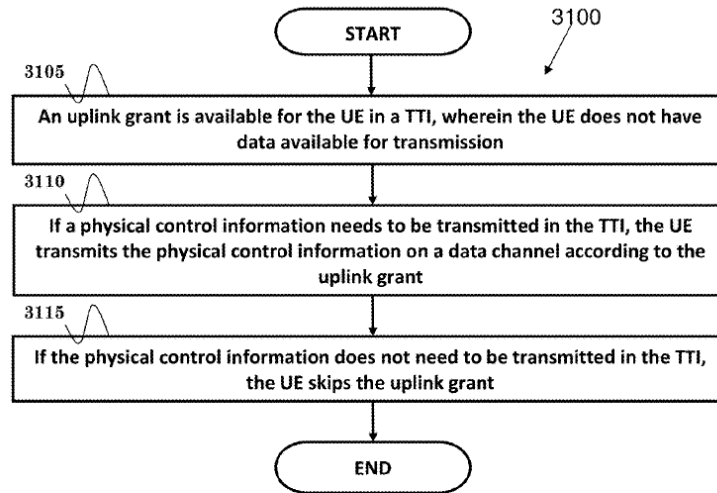


FIG. 31

Figure 31 is a flowchart showing the steps a UE performs to transmit PCI over a data channel. Ex. 1001, 2:51–52, 46:3–11.

In the scenario illustrated in Figure 31, an uplink grant for the data channel may be given even if the UE does not have data to transmit — e.g., if the UE does not have data in its buffer. *Id.* at 6:29–34, 39:21–23, 45:54–55, 46:5–6. The '878 patent explains that, even “if the UE does not have data available for transmission” in the uplink grant, the UE may have PCI that needs to be transmitted. *Id.* at 39:21–34. In that case, the UE will transmit PCI using the data channel uplink grant. *Id.* at 39:23–25, 46:6–9. On the other hand, if the UE does not have PCI to transmit, the UE will skip the data channel uplink grant and, so, will not send a transmission. *Id.* at 39:25–30, 45:55–58, 46:9–11, 46:25–28. That is, the '878 patent describes the scenario where a UE has a data channel uplink grant to transmit data, but no data for transmission; in that scenario, when the UE has PCI that needs to be transmitted, the UE transmits that PCI using the data channel uplink grant — but when the UE does not have PCI, it skips transmission. *Id.* at 36:17–32, 39:17–27, 45:53–58, 46:3–11, Figs. 30–31.

G. Challenged Claims

Petitioner challenges all claims, i.e., claims 1–28, of the '878 patent. Pet. 3. Of these, claims 1, 6, 11, and 16 are independent, and for purposes of this Decision, claim 1 is representative. Claim 1 is reproduced below with Petitioner's added limitation identifiers in brackets. *See* Pet. 31–39.

1. [1.0] A method of a UE (User Equipment), comprising:
 - [1.1] an uplink grant is available for the UE in a TTI (Transmission Time Interval), wherein the UE does not have data available for transmission;
 - [1.2] the UE determines whether to skip the uplink grant in the TTI according to whether a physical control information needs to be transmitted in the TTI or not; and
 - [1.3] the UE transmits the physical control information on a data channel according to the uplink grant if the physical control information needs to be transmitted in the TTI.

Ex. 1001, 48:46–56.

II. ANALYSIS

A. Legal Standards

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden of persuasion never shifts to the patent owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

The legal question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the

prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in evidence, objective evidence of nonobviousness. *Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 17–18 (1966). One seeking to establish obviousness based on more than one reference also must articulate sufficient reasoning with rational underpinnings to combine teachings. *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

B. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art (“POSITA”) in the field of the ’878 patent at the time of the earliest effective filing date (April 1, 2016) would have had at least a bachelor’s degree in electrical engineering, familiarity with the relevant 3GPP standards as of this time, and two years of experience working in a field involving wireless communications. Additional education may serve as a substitute for a lack of experience and vice versa.

Pet. 12 (citing Ex. 1003 ¶¶ 66–72).

Patent Owner does not expressly address the level of ordinary skill in the art. *See generally* Prelim. Resp.

For purposes of this Decision, we adopt Petitioner’s proposed level of skill, as articulated above. We are satisfied that Petitioner’s proposed definition generally comports with the level of skill necessary to understand and implement the teachings of the ’878 patent and the asserted prior art.

C. Claim Construction

We interpret claim terms using “the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b). Under the principles set forth by our

reviewing court, the “words of a claim ‘are generally given their ordinary and customary meaning,’” as would be understood by a person of ordinary skill in the art at the time of the invention. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)).

Petitioner offers a construction for the limitation reciting “UE determines whether to skip the uplink grant in the TTI according to whether a physical control information needs to be transmitted in the TTI or not.”

Pet. 8, 12. Petitioner asserts that limitation should be interpreted as

[i]f the UE has physical control information to transmit, the UE will transmit said control information. If on the other hand, the UE does not have physical control information to send, it will skip the uplink grant (i.e.,] the UE does not perform transmission (as clarified in claim 3)).

Pet. 8, 12 (citing Ex. 1002, 185). That is, Petitioner asserts that “skip” “refer[s] to non-transmission.” *Id.* at 12. Patent Owner does not dispute this assessment. *See generally* Prelim. Resp.

In its Preliminary Response, Patent Owner argues that “the uplink grants described and claimed by the ’878 patent are those with resource allocation for data transmission, and not grants for only PCI as in the case for aperiodic-report-only requests.” Prelim. Resp. 41. In other words, Patent Owner asserts “an uplink grant,” as recited in the claims, excludes “PCI-only grants and transmissions.” *Id.* at 42.

Based on the record before us, we do not find it necessary to expressly construe any claim terms or phrases to reach our decision. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (noting that “we need only construe 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))). In particular, in reaching our decision, we do not limit “an uplink grant” as suggested by the Preliminary Response and have applied the claim construction advanced by the Petition because, even under those constructions, Petitioner fails to show a reasonable likelihood of success with respect to its proposed grounds of unpatentability for the challenged claims of the '878 patent.

D. Ground 1: Obviousness over Ekpenyong, Huawei-374, and Huawei-192

Petitioner contends that the subject matter of claims 1–28 would have been obvious over Ekpenyong, Huawei-374, and Huawei-192. Pet. 18–52. Patent Owner argues that Petitioner’s showing is insufficient. Prelim. Resp. 35–67.

We have considered the parties’ arguments and the evidence presented, and we address them in the context of independent claim 1. Claim 1 recites similar subject matter as independent claims 6, 11, and 16, and Petitioner relies on its analysis and argument for independent claim 1 to account for remaining independent claims 6, 11, and 16. Pet. 69–73. For the reasons explained below, we determine that Petitioner has not demonstrated a reasonable likelihood that it will prevail in showing that the subject matter of claims 1–28 would have been obvious over the combination of Ekpenyong, Huawei-374, and Huawei-192.

1. Overview of Ekpenyong (Ex. 1004)

Ekpenyong relates to a technique for a UE to transmit channel state information (“CSI”) reports to a BS or eNB. Ex. 1004, code (57). CSI reports include information such as CQI, PMI, and RI. *Id.* at 5:44–50.

Ekpenyong explains that a CSI report can be sent using the PUSCH data channel and that those CSI reports can be periodic or aperiodic. *Id.* at 5:39–43. Ekpenyong explains that periodic or aperiodic CSI reports are sent based on respective uplink (“UL”) grants. *Id.* at 5:39–43, 8:55–62.

We discuss additional pertinent details of this reference in our analysis below.

2. Overview of Huawei-374 (Ex. 1005)

Huawei-374 is a proposal which, in relevant part, proposes two techniques, or “solutions,” for UE transmissions over the PUSCH data channel in the case where the UE has “no valid data to transmit.” Ex. 1005, 1, 3–4. Both solutions address “problems of the pre-scheduling solution,” i.e., periodic UE transmissions. *Id.* The first improvement increases PUSCH utilization by “piggyback[ing] some control information,” such as a CSI report, on the UE’s PUSCH uplink grant “even though there is no valid data to transmit.” *Id.* at 3. The second improvement saves UE transmission power and avoids uplink interference by “restrain[ing] the uplink PUSCH transmission” when there is “no available UL packet data.” *Id.* at 4. That is, in the second improvement, the uplink transmission is “skipped”¹⁴ such that there is “[n]o uplink PUSCH transmission.” *Id.*

We discuss additional pertinent details of this reference in our analysis below.

¹⁴ Petitioner refers to the restrained uplink transmission solution as “skipping” for brevity. Pet. 23–24. We adopt Petitioner’s shorthand.

3. *Overview of Huawei-192 (Ex. 1006)*

Huawei-192 is a proposal which further discusses the uplink transmission skipping technique described in Huawei-374. Ex. 1006, 1. Huawei-192 states that an agreement was made “to allow UEs to skip (most) dynamic and configured uplink transmissions if no data is available for transmission (the UE still sends the regular MAC CE, if any).” *Id.* Huawei-192 explains that “even if the UE has already been provided with UL Grant (i.e.,] by either dynamic scheduling or SPS), the UE will still skip the UL PUSCH transmission in case there is no available data to transmit.” *Id.*

We discuss additional pertinent details of this reference in our analysis below.

4. *Obviousness of Independent Claim 1*

As most relevant, claim 1 recites, where a “UE does not have data available for transmission” for an uplink grant, the “UE determines whether to skip the uplink grant . . . according to whether a physical control information needs to be transmitted.” Ex. 1001, 48:47–52. That is, the claim requires a UE, in the case that it does not have data to transmit, to determine whether to skip or to use its uplink grant, depending on whether PCI needs to be transmitted.

Although none of the references Petitioner relies on expressly discloses the claimed skipping determination according to PCI, Petitioner asserts that doing so would have been obvious over Ekpenyong, Huawei-374, and Huawei-192. *See* Pet. 25–30, 36–40. Patent Owner contends that it would not have been obvious. *See* Prelim. Resp. 43–67. We determine Petitioner has not presented sufficient evidence and arguments showing a POSITA would have found it obvious to make the claimed determination

according to whether PCI needs to be transmitted. Our detailed discussion follows below.

a) Petitioner's Combination and Proffered Motivation

We start with the teachings Petitioner relies on. First, Petitioner relies on Ekpenyong to teach a UE may transmit CSI¹⁵ over the PUSCH data channel pursuant an uplink grant, rather than “conventionally” transmitting CSI over the PUCCH control channel. Pet. 21–22 (citing Ex. 1004, 5:39–43, 8:56–58, 13:10–35). Petitioner also points out that Ekpenyong states CSI transmissions are “important” and that “performance could be improved” by transmitting CSI over PUSCH. *Id.* at 20–21 (citing Ex. 1004, 5:16–43).

Next, Petitioner relies on Huawei-374 and Huawei-192 to teach two “solutions” for PUSCH transmissions in the situation where a UE has an uplink grant but no data to transmit: (1) piggybacking, which uses the uplink grant to transmit CSI, and (2) skipping, which does not transmit anything over the uplink grant. Pet. 23–24 (citing Ex. 1005, 3–4; Ex. 1006, 1), 34, 36. In piggybacking, Petitioner asserts the PUSCH uplink grant is used to transmit CSI in a MAC PDU, thereby increasing PUSCH utilization. *Id.* at 36–37 (citing Ex. 1005, 3). In skipping, Petitioner asserts the PUSCH uplink grant is not used when there is no available data to send, thus saving UE transmission power and avoiding uplink interference. *Id.* at 37–38

¹⁵ Petitioner contends CSI discloses PCI because both terms refer to the same types of control information, i.e., CQI, RI, PMI. Pet. 35–36. Petitioner also equates uplink control information (“UCI”) with PCI. *Id.* at 53–54 (citing Ex. 1009, 86). We accept Petitioner’s contentions and use CSI, UCI, and PCI interchangeably.

(citing Ex. 1005, 4; Ex. 1006, 1). Petitioner also points out that Huawei-192 “discloses that skipping should be implemented in such a way that some non-data [MAC control element (‘CE’)] transmissions would not be skipped.” *Id.* at 27–28 (citing Ex. 1006, 1).

Before continuing on to Petitioner’s combination based on those teachings, we note that Huawei-374 describes piggybacking and skipping as *separate* solutions. *Compare* Ex. 1005, 3 *with id.* at 4 (discussing piggybacking in § 2.4 and skipping in § 2.5). Not only are piggybacking and skipping discussed in separate sections, but skipping is a solution for aperiodic and periodic uplink grants, while piggybacking is only discussed regarding periodic uplink grants. *Compare* Ex. 1006, 1 (discussing dynamic scheduling and semi-persistent scheduled (“SPS”) uplink grants) *with* Ex. 1005, 1, 4 (discussing pre-scheduled uplink resources). Furthermore, neither Huawei-374 nor Huawei-192 discloses using the solutions together, let alone selecting one solution over the other on the basis of PCI. That is, the references disclose the *outcomes* of the claimed determination (using an uplink grant to send PCI over PUSCH or skipping an uplink grant) — but do not disclose *making* the claimed determination according to whether PCI needs to be transmitted, i.e., “*determin[ing]* whether to skip the uplink grant . . . *according to* whether a physical control information needs to be transmitted.”

Addressing that limitation, Petitioner’s obviousness contention makes an “obvious” modification of another “obvious” modification. *See* Pet. 25–30, 36–39. In Petitioner’s first modification, Petitioner argues a POSITA would have found it obvious to “simultaneously” implement piggybacking and skipping, as disclosed by Huawei-374 and Huawei-192, in Ekpenyong’s PUSCH transmissions. Pet. 26–27, 39. But, it is not enough to simply add

piggybacking and skipping to Ekpenyong because the claim requires a determination as to whether or not to skip the uplink grant according to whether PCI needs to be transmitted. And, so, Petitioner needs a second modification, arguing a POSITA would have further found it obvious to alter the skipping solution to exempt PCI from skipping and then transmit PCI over the PUSCH data channel. Pet. 26 (“implement skipping in such a way that piggybacked control information was not skipped”), 29. Petitioner’s second modification is based on extending Huawei-192’s skipping exception for MAC CEs to further exempt PCI from skipping and to transmit PCI over PUSCH. *Id.* at 27–28. Petitioner characterizes MAC CEs and PCI both as “useful information” that should not be skipped. *Id.* Petitioner also asserts this modification is “the more logical and reasonable option” over “blindly” skipping PCI transmissions and “was at least obvious to try.” *Id.*

Petitioner argues a POSITA would have been motivated to make such modifications because “[d]oing so would have increased PUSCH utilization, improved battery consumption, and reduced uplink interference for Ekpenyong’s system.” *Id.* at 26 (citing Ex. 1005, 1, 3–4; Ex. 1003 ¶ 132), 37–38.

b) Discussion

We determine that Petitioner has not adequately shown for the purposes of institution that the claim would have been obvious over Ekpenyong, Huawei-374, and Huawei-192. Petitioner relies on obviousness to supply a missing limitation at the heart of the claimed invention, described in an exemplary embodiment described in the Specification, i.e., the “UE determines whether to skip the uplink grant . . . according to whether a physical control information needs to be transmitted.” *See*

Ex. 1001, 39:17–27 (identifying a “solution” to a particular scenario). We determine Petitioner has not adequately shown that a POSITA would have found it obvious to make the required modifications to reach the missing limitation for two separate reasons. First, the motivations Petitioner proffers inadequately support the combination of Ekpenyong, Huawei-374, and Huawei-192 and corresponding modifications. Second, Petitioner has not provided adequate argument and evidence showing that a POSITA would have found it obvious to modify skipping in Petitioner’s asserted manner to meet the missing limitation. We address both these reasons below.

We first turn to Petitioner’s proffered motivations for “simultaneously” implementing both piggybacking and skipping in a “complementary way.” Petitioner provides a list which incorporates all the independent benefits of the piggybacking and skipping solutions: “increased PUSCH utilization, improved battery consumption, and reduced uplink interference.” Pet. 26. We do not find these motivations persuasive. The functions and associated benefits of piggybacking and skipping appear to be mutually exclusive: piggybacking “*increase[s]* the PUSCH utilization” by sending PCI over PUSCH, whereas skipping seeks to *decrease* PUSCH utilization by “skip[ping] the UL PUSCH transmission” to save power and avoid uplink interference. *Compare* Ex. 1005, 3 (emphasis added) *with id.* at 4, *and* Ex. 1006, 1; *see* Ex. 2001 ¶¶ 96–97, 171. That is, the piggybacking benefit derives from *using* uplink grants, whereas the skipping benefits derive from *not using* uplink grants. Petitioner’s listing of independent benefits of opposing solutions does not explain why a POSITA would have simultaneously incorporated both piggybacking and skipping into Ekpenyong’s system in Petitioner’s suggested manner.

In that vein, Petitioner’s modification to the skipping solution vitiates the motivations Petitioner relies on to support incorporating the skipping solution. The skipping solution allegedly provides motivating benefits of improved battery consumption and reduced uplink interference by skipping “most” uplink grants. Ex. 1006, 1; *see* Ex. 1005, 3. Petitioner’s modification on the other hand seeks to *not* skip uplink grants by using uplink grants to send PCI, thereby diminishing the resultant benefits which allegedly motivate implementing the skipping solution. For these reasons, we determine Petitioner has not proffered sufficient motivation to simultaneously implement both piggybacking and its modified version of skipping in Ekpenyong.

Next, we turn to Petitioner’s modification of the skipping solution which, in order to meet the missing limitation, stretches Huawei-192’s skipping exception for MAC CEs to additionally exempt PCI from skipping and send PCI over the PUSCH data channel. We see a number of problems with Petitioner’s argument: first, Petitioner has not adequately shown that a POSITA would have found it obvious to apply MAC CE principles to PCI; second, Petitioner asserts its modification was “the preferable, logical, and most reasonable way” without persuasive supporting evidence and argument; and third, Petitioner’s modification diminishes the goals of the skipping solution without adequately resolving the discrepancy. We address each problem in turn below.

Petitioner offers inadequate explanation showing that a POSITA would take Huawei-192’s statement that *MAC CEs* should not be skipped as a suggestion that *PCI* should not be skipped and, instead, should be transmitted over PUSCH. Pet. 28–29. Neither Petitioner nor its Declarant, Dr. Bims, explains why a specific skipping exemption for MAC CEs would

more broadly suggest that “useful information,” specifically, PCI, should also be exempted from skipping. *See id.*; Ex. 1003 ¶ 137. Further, Petitioner’s reasoning broadly suggests that *any* “useful” information generated by the UE should not be skipped — adding unresolved complexity to implementing skipping. Moreover, Petitioner admits that MAC CEs are “different” than PCI, but Petitioner does not reconcile or address their technical differences. Pet. 28. Petitioner seems to understand that MAC CEs, contained in a MAC PDU on the UL-SCH transport channel, are specifically transmitted over the PUSCH data channel. *See id.* at 28 (citing Ex. 1001, 6:30–31, 42:2–3), 36–37 (citing Ex. 1005, 3); *see also* Ex. 2003 (65–66, 306 n.10 (“insert the so-called MAC control elements into the transport blocks to be transmitted over the transport channels,” i.e., UL-SCH on PUSCH). Because MAC CEs are transmitted over PUSCH, it is understandable that the PUSCH-specific skipping solution of Huawei-192 would exempt MAC CEs from being skipped. PCI, on the other hand, is *not* specific to PUSCH. Indeed, Petitioner notes it was “conventional” for PCI to be transmitted on *PUCCH*. Pet. 20–21 (citing Ex. 1001, 5:16–31; Ex. 1013, 1; Ex. 1024 ¶¶ 88–92; Ex. 1003 ¶¶ 107–115). As such, Petitioner has not adequately shown that a POSITA would have found it obvious to modify skipping to not skip PCI and, instead, transmit PCI over PUSCH based on Huawei-192’s statement that MAC CEs should not be skipped.

Additionally, Petitioner’s only evidence supporting its assertion that modifying skipping to exempt PCI from skipping was “preferred, logical, and most reasonable” is its Declarant’s similar assertion which does not add more detailed explanation. *See* Pet. 28–28 (citing Ex. 1003 ¶¶ 135–137). Patent Owner, on the other hand, offers more persuasive evidence contradicting Petitioner’s assertions that such modifications were preferred,

logical, and most reasonable. Patent Owner asserts the transmission standards and techniques described in its proffered technical documents and textbooks show that the adopted manner for transmitting PCI was not Petitioner's suggested technique; instead, PCI is transmitted using the PUCCH control channel (rather than the PUSCH data channel Petitioner relies on). Prelim. Res. 45–50 (citing Ex. 2001 ¶¶ 157, 160–166, 189–193; Ex. 2003, 203–204, 270 n.1; Ex. 2004, 142; Ex. 2006, 2; Ex. 2007, 163; Ex. 2014, 2). And, contradicting Petitioner's alleged binary choice of either skipping PCI altogether or not (Pet. 27–28 (“blindly skip important PCI transmissions”)), Patent Owner and its Declarant also offer a number of options in which skipping a PUSCH uplink grant skips PCI, but PCI is sent in another manner; those options are supported with evidence in the form of discussion and technical details from 3GPP members. Prelim. Resp. 56–67 (citing Ex. 2001 ¶¶ 160, 178, 180–184, 188–190, 194–196, 199–200, 202–209; Ex. 2003, 203–204, 270–271; Ex. 2004, 142; Ex. 2007, 163; Ex. 2008, 3; Ex. 2009, 1; Ex. 2014, 2; Ex. 2009, 1; Ex. 2020 ¶¶ 28, 43; Ex. 2022 ¶¶ 85–86; Ex. 2030, 77; Ex. 2037 ¶¶ 36–38; Ex. 2040, 1; Ex. 1005, 2; Ex. 1006, 1; Ex. 1017, 7; Ex. 1018, 50–56). For example, one alternative expressly states that if “UL data is skipped . . . the UCI should be sent on PUCCH.” Ex. 2007, 163. As such, ample evidence contradicts Petitioner's assertion that PCI would “blindly” be skipped were it not for Petitioner's modification.

Finally, as similarly discussed above, Petitioner's modification such that *fewer* transmissions are skipped runs counter to the operation of skipping transmissions which skips *most* transmissions. Ex. 1006, 1. In fact, Petitioner highlights that “Huawei-192 explicitly states that skipping was beneficial for ‘most’ rather than all uplink grants.” Pet. 27 (citing

Ex. 1003 ¶ 136). But Petitioner does not address this tension that adding additional skipping exceptions results in fewer uplink grants being skipped, diminishing the benefit of skipping “most” uplink grants. As such, Petitioner has not adequately shown that a POSITA would have modified the skipping solution disclosed in Huawei-374 and Huawei-192 to create an exception to skipping on the basis of PCI.

Accordingly, for the reasons discussed above, we determine that Petitioner has not sufficiently shown that an ordinarily skilled artisan would have found it obvious to combine and modify Ekpenyong, Huawei-374, and Huawei-192 as proposed. As a result, we determine that Petitioner fails to show a reasonable likelihood that claim 1 would have been obvious over Ekpenyong, Huawei-374, and Huawei-192.

5. Remaining Claims

For independent claims 6, 11, and 16, Petitioner references the arguments, evidence, and motivation it provides in its analysis of claim 1. *See* Pet. 44–51. As such, Petitioner’s analysis of these claim suffers from the same deficiencies as those discussed above.

Claims 2–5, 7–10, 12–15, and 17–25 depend from independent claim 1, 6, 11, or 16. Petitioner’s analysis of those dependent claims does not cure the above-noted deficiencies with respect to claims 1, 6, 11, and 16. *See* Pet. 40–44, 47–52.

Accordingly, for the reasons explained above in § II.D.4.b, Petitioner fails to make a sufficient showing for these claims.

6. Conclusion

Accordingly, Petitioner has not shown a reasonable likelihood that it will prevail with respect to any of the claims challenged in Ground 1 of the Petition. We address Ground 2, below.

E. Ground 2: Obviousness Based on Novlan, TS-212, TS-213, Samsung-332, and Samsung-333

Petitioner contends that the subject matter of claims 1–28 would have been obvious over Novlan, TS-212, TS-213, Samsung-332, and Samsung-333. Pet. 52–73. Patent Owner argues that Petitioner’s showing is insufficient. Prelim. Resp. 65–72.

We have considered the parties’ arguments and the evidence presented, and we address them in the context of representative claim 1. For the reasons explained below, we determine that Petitioner has not demonstrated a reasonable likelihood that it will prevail in showing that the subject matter of claims 1–28 would have been obvious over the combination of Novlan, TS-212, TS-213, Samsung-332, and Samsung-333.

1. Overview of Novlan (Ex. 1011)

Novlan, in relevant-part, describes a wireless network where user equipment, e.g., a smartphone, communicates with a base station, e.g., an eNB, for wireless broadband access. Ex. 1011, 1:55–59, 4:58–60, 5:9–24. Novlan explains that wireless communications may occur using various wireless communication techniques, e.g., LTE. *Id.* at 5:4–8. Furthermore, Novlan incorporates by reference 3GPP standards descriptions such as 3GPP TS 36.212 v12.2.0 and 3GPP TS 36.213 v12.2.0. *Id.* at 4:21–27.

We discuss additional pertinent details of this reference in our analysis below.

2. *Overview of TS-212 (Ex. 1009)*

The technical specification 3GPP TS 36.212 V13.0.0 (“TS-212”) describes techniques for sending UCI on physical channels, e.g., PUCCH and PUSCH. Ex. 1009, 5, 8. TS-212 explains that UCI, which includes CQI, PMI, HARQ-ACK, and RI, can be transmitted via PUCCH or PUSCH. *Id.* at 8, 86. TS-212 also describes UCI sent via PUSCH without UL-SCH data. *Id.* at 86.

We discuss additional pertinent details of this reference in our analysis below.

3. *Overview of TS-213 (Ex. 1010)*

Technical specification 3GPP TS 36.213 V12.5.0 (“TS-213”) describes techniques for a UE to report CSI via PUCCH or PUSCH. Ex. 1010, 6, 74. In one technique in which a UE is not configured for simultaneous PUSCH and PUCCH transmission, the UE transmits periodic CSI reporting on PUCCH. *Id.* at 74. On the other hand, where a UE is configured for simultaneous PUSCH and PUCCH transmission, the UE transmits periodic CSI reporting on PUSCH. *Id.* Finally, a UE transmits aperiodic CSI reporting on PUSCH under certain conditions. *Id.*; *see id.* at 77–84.

We discuss additional pertinent details of this reference in our analysis below.

4. *Overview of Samsung-332 (Ex. 1007)*

Samsung-332 is a document that discusses a “problem” when a UE is allocated an uplink transmission but does not have data to transmit and, so, the UE sends padding MAC PDUs which drain its battery. Ex. 1007, 1.

Samsung-332 suggests allowing the UE to skip the uplink transmission if no data is available for transmission. *Id.* Samsung-332 states that either dynamic or configured uplink grants can be skipped. *Id.* at 2.

We discuss additional pertinent details of this reference in our analysis below.

5. *Overview of Samsung-333 (Ex. 1008)*

Samsung-333 is a change request that suggests a change to transmission techniques in which a UE will skip an uplink grant when it does not have data to send. Ex. 1008, 1. Samsung-333 explains that, when an uplink is granted, a UE “transmits UL-SCH even when it does not have any data to send” which “drains UE battery.” *Id.* To address that, the UE does “not initiate UL-SCH transmission when [the] UE does not have data to transmit.” *Id.* at 1–2.

We discuss additional pertinent details of this reference in our analysis below.

6. *Obviousness of Independent Claim 1*

In Ground 2, as in Ground 1, claim 1 most relevantly recites where a “UE does not have data available for transmission” for an uplink grant, the “UE determines whether to skip the uplink grant . . . according to whether a physical control information needs to be transmitted.” Ex. 1001, 48:47–52.

And, as in Ground 1, although none of the references relied upon by Petitioner in Ground 2 — Novlan, TS-212, TS-213, Samsung-332, and Samsung-333 — expressly discloses the claimed skipping determination according to PCI, Petitioner asserts it would have been obvious to do so. *See* Pet. 56–59, 61–64. Patent Owner contends it would not have been

obvious. *See* Prelim. Resp. 67–73. We determine Petitioner has not presented sufficient evidence and argument showing it would have been obvious to make the claimed determination according to PCI. Our detailed discussion follows below.

a) Petitioner’s Combination and Proffered Motivation

We start with the teachings on which Petitioner relies. First, Petitioner relies on Novlan to teach a UE for use in 3GPP standard wireless networks, specifically, the wireless networks described in TS-212 and TS-213. Pet. 52 (citing Ex. 1009; Ex. 1010; Ex. 1011, 4:21–35, 4:58–5:8, 7:60–9:16).

Further, Petitioner relies on TS-212 and TS-213 to teach a UE which sends PCI to a BS using a granted uplink for PUSCH transmission. *Id.* at 53–54 (citing Ex. 1009, 86; Ex. 1010, 74). Petitioner also relies on TS-212 and TS-213 to teach that PCI can be sent over PUSCH even without accompanying data, e.g., without UL-SCH data. *Id.* (citing Ex. 1009, 86; Ex. 1010, 74).

Still further, Petitioner relies on Samsung-332 and Samsung-333 to teach skipping UL grants when a UE does not have data to transmit. *Id.* at 55–56 (citing Ex. 1007, 1; Ex. 1008, 1). Petitioner also alleges that Samsung-333 “discloses and teaches that [Samsung-332’s and Samsung-333’s] skipping functionality would be implemented by having the UE’s MAC entity not generate and transmit empty padding only, while the UE would still transmit PCI on PUSCH pursuant to the UL grant when necessary.” *Id.* at 57, 62 (citing Ex. 1003 ¶¶ 251, 267; Ex. 1008, 1).

From those teachings, Petitioner asserts the claimed “determin[ation] whether to skip the uplink grant . . . according to whether a physical control

information needs to be transmitted” would have been obvious based on two modifications. In Petitioner’s first modification, Petitioner argues a POSITA would have found it obvious to implement Samsung-332 and Samsung-333’s skipping technique to improve Novlan such that Novlan’s UE would skip an unnecessary UL grant and therefore preserve battery life and avoid wasting UL resources. Pet. 57 (citing Ex. 1003 ¶ 249). Next, Petitioner asserts that such an implementation would require a POSITA to then “choose between two possible options (1) skip the uplink grant entirely, even if Novlan’s UE needed to transmit control information on PUSCH; or (2) skip the uplink grant if there was no data and no control information to transmit on PUSCH.” *Id.* (citing Ex. 1003 ¶ 250). Asserting “Samsung-333 discloses and teaches option (2),” Petitioner makes its second modification, arguing that it would have been obvious to a POSITA “to transmit data and/or physical control information pursuant to an uplink grant and skip the uplink grant if the UE did not have either type of information to transmit.” *Id.* at 57–58, 63 (citing Ex. 1003 ¶¶ 251, 267).

Petitioner supports this modification by asserting “a POSITA would have been motivated to choose the logical option of continuing to transmit PCI on PUSCH” because “both Samsung-332 and Samsung-333 identified padding transmissions as the cause of the UL resource waste and UE battery drain problem.” *Id.* at 58 (citing Ex. 1003 ¶ 252). Petitioner also supports its modification by arguing PCI transmissions “conveyed important control information and were not the type of empty, repetitive, battery-draining transmissions that Samsung proposed skipping.” *Id.* at 63 (citing Ex. 1003 ¶¶ 267–268).

b) Discussion

We determine that Petitioner has not adequately shown for the purposes of institution that claim 1 would have been obvious over Novlan, TS-212, TS-213, Samsung-332, and Samsung-333. First, Petitioner’s obviousness challenge relies on a factual allegation that is not supported by the record, specifically, that Samsung-333 teaches or suggests skipping the uplink grant if there is no data *and* no control information to transmit on PUSCH. Pet. 57, 62. Second, as it did in Ground 1, Petitioner’s challenge relies on obviousness to supply a key missing limitation without adequate support, specifically, “the UE determines whether to skip the uplink grant . . . according to whether physical control information needs to be transmitted.” See Pet. 58, 63. But Petitioner has not provided adequate argument and evidence showing that a POSITA would have found the missing limitation obvious. We address each reason in detail below.

To address the first deficiency in Petitioner’s obviousness argument, we agree with Patent Owner (Prelim. Resp. 69 (citations omitted)) that Petitioner has not adequately shown “Samsung-333 discloses and teaches that Samsung’s proposed skipping functionality would be implemented by having the UE’s MAC entity not generate and transmit empty padding only, *while the UE would still transmit PCI on PUSCH pursuant to the UL grant when necessary (as was conventional)*” (Pet. 57 (emphasis added), 62). Or, put another way, Petitioner has not shown that Samsung-333 teaches or suggests “skip[ping] the uplink grant if there was no data and no control information to transmit on PUSCH.” See *id.* Petitioner’s factual allegation is based on Samsung-333’s statement that “the MAC entity considers itself having a valid uplink grant only if there is data available for transmission.” *Id.* (citing Ex. 1003 ¶¶ 250–251, 267; Ex. 1008, 1–2). Citing its Declarant,

Petitioner asserts, because the MAC entity resides in layer 2 and PCI is provided for transmission in layer 1, only the layer 2 MAC entity skips transmission and the UE would still transmit layer 1 PCI on PUSCH pursuant to the UL grant. *Id.* (citing Ex. 1003 ¶ 251).

Petitioner’s factual allegation is unsupported, if not contradicted, by the plain reading of Samsung-332 and Samsung-333. Samsung-333 and Samsung-332 both only discuss skipping uplink transmission “if no data is available” — not on the basis of data *and* PCI. Ex. 1007, 1; Ex. 1008, 1–2. In fact, neither Samsung-333 nor Samsung-332 even mention PCI or what technique is used to transmit PCI — let alone disclose transmitting, or not transmitting, according to whether PCI needs to be transmitted (*see generally* Ex. 1007; Ex. 1008). Further, Samsung-332 and Samsung-333 do not state that skipping is exclusive to the layer 2 MAC entity as asserted by Petitioner. *See generally* Ex. 1007; Ex. 1008. Rather, Samsung-332 discusses skipping in terms of the *UE* skipping, not the layer 2 MAC entity, stating the “[s]traightforward solution would be to allow [the] *UE* to skip uplink transmission if no data is available for transmission.” Ex. 1007, 1 (emphasis added).

And, even if the disclosed skipping solution were specific to the MAC entity skipping the uplink grant, Petitioner inadequately shows that it follows that Samsung-332 and Samsung-333 would therefore transmit PCI over the PUSCH uplink grant using that uplink grant, as opposed to another technique. As discussed above, Samsung-332 and Samsung-333 do not discuss PCI, let alone the techniques and conditions for its transmission. *See generally* Ex. 1007; Ex. 1008. Moreover, even if it was “conventional” to transmit PCI over PUSCH as Petitioner asserts (Pet. 57), it does not necessarily follow that Samsung-332 and Samsung-333 would therefore

transmit PCI over PUSCH. As Petitioner has noted, sending PCI over PUCCH was also “conventional.” Pet. 20–21 (citing Ex. 1004, 5:16–67; Ex. 1013, 1; Ex. 1024 ¶¶ 88–92; Ex. 1003 ¶¶ 107–115). In fact, Petitioner reproduces and highlights portions of another relied-upon reference, Novlan, describing transmitting CSI over PUCCH. Pet. 62 (citing Ex. 1010, 74). Accordingly, Petitioner has not adequately proven its factual allegation. As Petitioner’s obviousness challenge relies on this inadequately proven factual allegation (*see* Pet. 57–58), Petitioner has not adequately shown the claim would have been obvious.

We also determine that Petitioner has not adequately shown a POSITA would have found it obvious that “the UE determines whether to skip the uplink grant . . . according to whether physical control information needs to be transmitted.” None of the references discloses determining whether to skip an uplink grant according to whether PCI needs to be transmitted, but Petitioner asserts “[a]t the very least, it would have been obvious in view of Samsung-332 and Samsung-333 to skip only the empty padding transmissions while still transmitting data or PCI.” Pet. 58 (citing Ex. 1003 ¶ 252). In a similar vein as Ground I, Petitioner bases its argument on the premise that “a POSITA would have been motivated to choose the logical option of continuing to transmit PCI on PUSCH,” rather than skipping the uplink grant entirely. *Id.*; *see id.* at 57. However, as discussed above in Ground 1 (§ II.D.4.b), Patent Owner has presented more persuasive evidence and argument showing that those were not a POSITA’s only two options for PCI transmission. *See* Prelim. Resp. 70–71 (citing Ex. 2004, 142; Ex. 2001 ¶¶ 218–219; *see also id.* at 56–67 (citations omitted)). Indeed, Patent Owner points out a different option was adopted for PCI

transmission than Petitioner’s proffered option, namely transmitting PCI over PUCCH. *Id.* at 45–50 (citations omitted).

Additionally, Petitioner’s proffered motivation does not support the modification it argues would have been obvious. Petitioner states that “[s]ince both Samsung-332 and Samsung-333 identified padding transmissions as the cause of the UL resource waste and UE battery drain problem, a POSITA would have been motivated to choose the logical option of continuing to transmit PCI on PUSCH.” Pet. 58 (citing Ex. 1003 ¶ 252). That is, Petitioner relies on the benefits of skipping transmissions as the motivation to determine that PCI should be transmitted over PUSCH. While skipping transmissions appears to beneficially save resources, it is unclear how resource savings motivates transmitting PCI over PUSCH. Similarly, it is unclear how resource savings from skipping motivate making *exceptions to skipping* by determining whether or not to skip according to whether PCI needs to be transmitted. As such, Petitioner does not proffer sufficient motivation in support of its modification to reach the missing limitation. For the above reasons, Petitioner has not adequately shown that a POSITA would have found it obvious that “the UE determines whether to skip the uplink grant . . . according to whether physical control information needs to be transmitted.”

Accordingly, we determine that Petitioner has not sufficiently shown that an ordinarily skilled artisan would have combined and modified Novlan, TS-212, TS-213, Samsung-332, and Samsung-333 as proposed for the motivations proffered. As a result, we determine that Petitioner fails to show a reasonable likelihood that claim 1 would have been obvious over Novlan, TS-212, TS-213, Samsung-332, and Samsung-333.

7. *Remaining Claims*

For independent claims 6, 11, and 16, Petitioner references the arguments, evidence, and motivation it provides for claim 1. *See* Pet. 69–73. As such, Petitioner’s analysis of these claim suffers from the same deficiencies identified above.

Claims 2–5, 7–10, 12–15, 17–25, 27, and 28 depend from independent claim 1, 6, 11, or 16 and Petitioner’s analysis of those dependent claims does not cure the above-noted deficiencies with respect to claims 1, 6, 11, and 16. *See* Pet. 65–69, 72–73.

Accordingly, for the reasons explained above in § II.E.6, Petitioner fails to make a sufficient showing for these claims.

8. *Conclusion*

Accordingly, Petitioner has not shown a reasonable likelihood that it will prevail with respect to any of the claims challenged in Ground 2 of the Petition.

III. DISCRETIONARY DENIAL UNDER 35 U.S.C. § 314

Petitioner contends we should not exercise our discretion under 35 U.S.C. § 314(a) to deny institution in deference to the co-pending district court infringement litigation. *See* Pet. 9–11. In support, Petitioner states it “presents a *Sotera* stipulation.” *Id.* (citing Ex. 1027). Petitioner further contends we should not exercise our discretion under 35 U.S.C. § 325(d) to deny institution because the “evidence identified in this Petition was not before the examiner during prosecution” and that evidence remedies an error by the Office. *Id.* at 11. Patent Owner does not address discretionary denial in its Preliminary Response. *See generally* Prelim. Resp.

As discussed above, we deny institution on the merits of the Petition. As such, we need not address discretionary denial.

IV. CONCLUSION

As explained above, Petitioner has not shown a reasonable likelihood that it will prevail on any of the grounds asserted in the Petition. Accordingly, we do not institute an *inter partes* review.

V. ORDER

It is:

ORDERED that the Petition is denied and no *inter partes* review is instituted.

FURTHER ORDERED that, within two weeks of the entry date of this decision, the parties shall meet and confer to agree upon and jointly submit via an email to the Board a proposed redacted public version of this decision.

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