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Paper 47
Entered: September 22, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TCT MOBILE INTERNATIONAL LIMITED, TCT MOBILE, INC., TCT MOBILE (US) INC., TCT MOBILE (US) HOLDINGS, INC., TCL COMMUNICATION TECHNOLOGY HOLDINGS LIMITED, CRADLEPOINT, INC., HONEYWELL INTERNATIONAL, INC., SIERRA WIRELESS, INC., and THALES DIS AIS DEUTSCHLAND GMBH,
Petitioner,

v.

SISVEL S.P.A.,
Patent Owner.

IPR2021-00678
Patent 8,971,279 B2

Before JAMESON LEE, MIRIAM L. QUINN, and AARON W. MOORE, *Administrative Patent Judges*.

QUINN, *Administrative Patent Judge*.

DECISION
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

TCT Mobile International Limited, TCT Mobile, Inc., TCT Mobile (US) Inc., TCT Mobile (US) Holdings, Inc., TCL Communication Technology Holdings Limited, Cradlepoint, Inc., Honeywell International, Inc., Sierra Wireless, Inc., and Thales DIS AIS Deutschland GmbH (collectively "Petitioner")[1] filed a Petition (Paper 7, "Petition" or "Pet.") requesting an *inter partes* review of claims 1, 3–5, 11, and 13–15 ("the challenged claims") of U.S. Patent No. 8,971,279 B2 (Ex. 1001, "the '279 patent"). Sisvel S.p.A. ("Patent Owner") filed a Preliminary Response. Paper 12 ("Preliminary Response" or "Prelim. Resp."). After considering the merits of the Petition and the arguments against institution by Patent Owner, we instituted *inter partes* review. Paper 18 ("Dec. on Inst.").

During the trial phase, Patent Owner filed a Response (Paper 27, "PO Resp."), Petitioner filed a Reply (Paper 33, "Reply"), and Patent Owner filed a Sur-reply (Paper 35, "Sur-reply"). We held oral argument on June 29, 2002, the transcript of which is filed in the record. Paper 46 ("Tr.").

We have jurisdiction under 35 U.S.C. § 6. We issue this Final Written Decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons explained below, Petitioner has shown by a preponderance of the evidence

[1] In the Petition, Petitioner also named ZTE Corporation and ZTE (USA) Inc. ("the ZTE entities"), as well as Dell Inc. ("Dell"), as Petitioner constituents. Pet. 1. However, we granted (Papers 15, 26) respective joint motions from the ZTE entities and Patent Owner (Paper 13), and Dell and Patent Owner (Paper 23), to terminate this proceeding with respect to the ZTE entities and Dell and dismiss them from it. Because the ZTE entities and Dell are no longer parties to this proceeding, we do not identify them herein.

that claims 1, 3–5, 11, and 13–15 of the '279 patent are unpatentable. *See* 35 U.S.C. § 316(e) (2018).

II. BACKGROUND

A. Real Parties in Interest

Petitioner identifies as real-parties-in-interest the Petitioner entities identified above, as well as Dell Inc., "Dell Marketing L.P., Dell Products L.P., Dell Technologies Inc., Denali Intermediate Inc., Sierra Wireless America, Inc., ZTE Corporation, and ZTE (USA) Inc., Thales DIS AIS USA, LLC, Telefonaktiebolaget LM Ericsson, and Ericsson Inc." *See* Paper 29. Patent Owner identifies itself, Sisvel S.p.A., as the real party in interest. Paper 9. However, the Dell and ZTE entities were terminated before issuance of this Final Written Decision. Papers 15, 26.

B. The '279 Patent

The '279 patent relates to "scheduling radio resources for semi-persistent uplink/downlink packet data transmission in a cellular wireless communication system." Ex. 1001, 1:21–29. The '279 patent describes a "method and apparatus for informing a UE of [semi-persistent scheduling (SPS)] deactivation without adding a new bit field or a new control channel format in a communication system for allocating resources." *Id.* at 3:67–4:3. The method includes "receiving, by a user equipment (UE), a downlink control channel including resource allocation information, and releasing resource allocation for the UE when a binary field indicating the resource allocation information is entirely filled with 1." *Id.* at 4:5–11. According to the '279 patent, "[t]he downlink control channel may be a physical downlink control channel (PDCCH)," and the resource allocation information may be a binary field representing a resource indication value

(RIV), which indicates a start resource block and the length of consecutively allocated resource blocks (RBs). *Id.* at 5:8–9, 5:12–15, 13:35–38. The '279 patent describes using a conventional RIV table to determine whether the RIV is valid or invalid: RIVs defined in the table are referred to as valid RIVs, whereas RIVs undefined in the table are referred to as invalid RIVs. *Id.* at 17:47–53. The '279 patent further describes that "when a downlink control signal format based on the compact-type RB allocation scheme is used for signaling SPS activation and/or SPS deactivation, an RIV contained in the PDCCH from which the SPS [cell radio network temporary identifier] (SPS C-RNTI) is detected may be used as signaling information for SPS deactivation indication" if it "[has] any one of values capable of being used as the above-mentioned invalid RIVs." *Id.* at 21:33–41.

For example, "according to the RIV construction method shown in Table 1, a valid RIV indicating a generable RB allocation combination may be any one of RIVs from 0 to 209 (where this RIV '209' is a maximum valid RIV)," whereas "an invalid RIV may be any one of RIVs from 210 to 255." *Id.* at 21:42–46, Table 1. "If the RIV . . . belongs to the invalid RIV, the UE recognizes that signaling information indicating SPS deactivation is transmitted." *Id.* at 21:46–50. "Specifically, in the case where the RIV . . . is determined to be the . . . specific value acquired when the entirety of the binary field is filled with 1, it can be recognized that signaling information indicating SPS deactivation is transmitted on the basis of the above specific value." *Id.* at 21:55–60. For example, "[a]s shown in FIG. 17, if the RIV binary field is composed of 8 bits, a binary number RIV ($=11111111_2$) is acquired," which "may indicate that signaling information indicating SPS deactivation was transmitted." *Id.* at 21:63–67, Fig. 17.

C. Related Matters

As required by 37 C.F.R. § 42.8(b)(2), the parties identify judicial matters that would affect, or be affected by, a decision in this proceeding. In particular, the Parties indicate that the '279 patent is involved in the following district court cases:

Case Number	Venue	Filing Date
3:20-cv-01289	N.D. Tex.	May 18, 2020
1:20-cv-00649	D. Del.	May 15, 2020
1:20-cv-00651	D. Del.	May 15, 2020
1:20-cv-00652	D. Del.	May 15, 2020
1:20-cv-00653	D. Del.	May 15, 2020
1:20-cv-00654	D. Del.	May 15, 2020
1:20-cv-00655	D. Del.	May 15, 2020
1:20-cv-00656	D. Del.	May 15, 2020
1:20-cv-00658	D. Del.	May 15, 2020
1:20-cv-00659	D. Del.	May 15, 2020
1:20-cv-22050	S.D. Fla.	May 15, 2020
1:20-cv-22051	S.D. Fla.	May 15, 2020
1:20-cv-22054	S.D. Fla.	May 15, 2020

Pet. 3–4; Paper 9, 1.

D. Illustrative Claim

Petitioner challenges claims 1, 3–5, 11, and 13–15 of the '279 patent. Pet. 9. Claims 1 and 11 are independent. Claim 1 is illustrative and reproduced below (with italicized portion identified for emphasis).

> 1. A method for deactivating Semi-Persistent Scheduling (SPS) transmission in a wireless mobile communication system, the method comprising:

> performing, by a User Equipment (UE), a SPS transmission at an interval of a subframe period configured by a radio resource control (RRC) signal;
>
> receiving, by the UE, a Physical Downlink Control Channel (PDCCH) signal with a Radio Network Temporary Identifier (RNTI), wherein the PDCCH signal includes a first field related to a resource allocation; and
>
> performing a procedure for deactivating the SPS transmission if the PDCCH signal satisfies conditions for SPS deactivation,
>
> *wherein the conditions for SPS deactivation include: the RNTI is a SPS Cell RNTI (SPS C-RNTI); and the first field is entirely filled with '1'.*

Ex. 1001, 26:2–17 (emphasis added). We refer hereinafter to the italicized portion of the claim as the "SPS deactivation conditions."

Claim 11 is substantively similar to claim 1 and, therefore, both claims are analyzed together in the Petition and in our analysis below.

E. Asserted Grounds and Testimony

Petitioner presents the challenges summarized in the chart below. Pet. 12.

Claim(s) Challenged	35 U.S.C. §	Reference/Basis
1, 3–5, 11, 13–15	103(a)[2]	Dahlman,[3] Samsung[4]

[2] The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) ("AIA"), included revisions to 35 U.S.C. § 103 that became effective after the effective filing date of the challenged claims. Therefore, we apply the pre-AIA version of 35 U.S.C. § 103.

[3] Erik Dahlman et al., *3G Evolution: HSPA and LTE for Mobile Broadband* 1–608 (2d ed. 2008) (Ex. 1003, "Dahlman").

[4] Tdoc R2-084455, *SPS resource release*, 3GPP TSG-RAN2#63 Meeting, Jeju, South Korea, 18–22 August 2008 (Ex. 1005, "Samsung").

Claim(s) Challenged	35 U.S.C. §	Reference/Basis
1, 3–5, 11, 13–15	103(a)	Nokia,[5] Samsung
1, 3–5, 11, 13–15	103(a)	Nokia
1, 3–5, 11, 13–15	103(a)	Dahlman, Samsung, Nokia

Petitioner supports its unpatentability challenge with a declaration of Mark R. Lanning, filed as Exhibit 1002 ("Lanning Decl."). Petitioner also supports its assertions concerning the status of the prior art as printed publications with declarations from James L. Mullins, Ph.D. (Ex. 1006) and Craig Bishop (Ex. 1007).

Patent Owner supports its response with testimony from Michael Smith, Ph.D., filed as Exhibit 2005 ("Smith Decl.").

III. ANALYSIS

A. Level of Ordinary Skill in the Art

Petitioner contends that a person of ordinary skill in the art (POSA) "at or about the time of the alleged invention would have had a degree in electrical engineering, computer engineering, computer science or a similar discipline, with at least three years of relevant industry or research experience, including experience designing or implementing wireless radio systems for data transmission," and that "[a] POSA would also have familiarity with the 3GPP specifications, including LTE." Pet. 23–24 (citing Ex. 1001, 1:31–35; Lanning Decl. ¶ 31).

Patent Owner contends that "[a] person having ordinary skill at the time of invention, November 13, 2008, in the relevant art would be one with a bachelor's degree in electrical engineering, computer sciences, or

[5] R1-083718, *Missing details of semi-persistent scheduling*, 3GPP TSG-RAN WG1 Meeting #54bis, Prague, Czech Republic, 29 September–3 October 2008 (Ex. 1004, "Nokia").

telecommunications, along with a minimum of three to five years of practical experience in the field," and that "[a] combination of more experience in the field and less education or more education and less experience in the field would also suffice." PO Resp. 11–12.

At the institution stage, we adopted Petitioner's assessment of the level of skill in the art, which encompasses that proposed by Patent Owner and is consistent with the specification of the '279 patent and asserted prior art of record. Our Decision stated that "Patent Owner's argument that a person of ordinary skill in the art would not have needed to be a *member* of a standard-setting organization does not address the standard actually proposed by Petitioner – *familiarity* with the 3GPP specifications, including LTE." Dec. on Inst. 7–8. We stated that the '279 patent devotes a significant portion of its disclosure to discussing 3GPP LTE communications systems and, thus, we find familiarity with 3GPP specifications would have been expected of a person of ordinary skill in the art. *Id.* at 8. And we stated that the asserted prior art addresses and describes 3GPP specifications, and, therefore, it is reasonable to conclude that a person of ordinary skill in the art would have had familiarity with such specifications. *Id.*

Patent Owner responds to our determination by disagreeing "that a POSITA would have 'familiarity with the 3GPP specifications' to the extent Petitioner [is] using the concept of 'familiarity' to import arguments that are not based on the asserted prior art references." PO Resp. 12. Further, Patent Owner "does not agree that a POSITA's understanding that '3GPP specifications' exist implies that a 'specific functional area of the standard' exists for any given argument asserted by Petitioners." *Id.*

Patent Owner's argument does not point out why a person of ordinary skill in the art would not have familiarity with the 3GPP specifications existing at the time of the invention. Patent Owner's objection does little to identify which aspect of the 3GPP familiarity would not have been known to a person of ordinary skill in the art despite the evidence of record in the patent at issue itself and the presented prior art. *See* Reply 4 (Petitioner arguing that various 3GPP standards were cited as relevant prior art on the face of the patent and that the references and the '279 patent specifically address the 3GPP specifications as a central focus of the field in the art). Nor does Patent Owner dispute that such familiarity is evident from the present record. Accordingly, we find unpersuasive the objection to the concept of "familiarity" without identifying which knowledge of a person of skill in the art would be insufficiently present to make a difference in the outcome of this proceeding. Patent Owner's objection, stated differently, goes to how Petitioner addresses the unpatentability grounds in light of what is known in the art – rather than disputing the actual level of a person of ordinary skill in the art.

Based on the evidence of record, the specification of the '279 patent, and the prior art of record, Dahlman, Samsung, and Nokia, we determine that Petitioner's articulated level of ordinary skill in the art is proper, including that familiarity with 3GPP specifications would be part of the knowledge such a person would have had at the time of the invention.

B. Claim Construction

In *inter partes* review proceedings based on petitions filed on or after November 13, 2018, such as this one, we construe claims using the same claim construction standard that would be used in a civil action under

35 U.S.C. § 282(b), as articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc), and its progeny. *See* 37 C.F.R. § 42.100(b).

Petitioner asserts that "all claim terms should be accorded their plain and ordinary meaning, as understood by a POSA consistent with the specification and file history of the '279 patent." Pet. 23. Patent Owner took no position regarding claim construction in the Response. PO Resp. 13. However, in the Sur-reply, Patent Owner for the first time raised what appears to be a claim scope dispute pertaining to the term "Resource Indication Value (RIV)," recited in claims 4 and 14. Sur-reply 5–6. According to Patent Owner, "[a]n RIV is defined in the '279 patent's specification based on a series of calculations (e.g., an 'RIV construction method')." *Id.* at 5. Patent Owner cites the '279 patent specification at columns 16 and 18, almost in their entirety, as support for such a statement and refers back to the section in Patent Owner's Response that describes a summary of the '279 patent. *Id.* (citing Ex. 1001, 16:1–18:51 and PO Resp. 8–11). In short, it appears that Patent Owner desires the term "Resource Indication Value (RIV)" to be construed to implement the equations disclosed in that specific portion of the specification as an "RIV construction method" unique to the '279 patent, and, therefore, to the claim. *See also* Tr. 48:23–51:12. We decline to construe the term to have the meaning urged by Patent Owner.

Defining the term "Resource Indication Value (RIV)" to include the specific calculations disclosed in columns 16 through 18 of the '279 patent, without a cogent and properly supported explanation for why the term should be thus construed, would amount to improperly importing a limitation into the claim from a preferred embodiment. *Phillips v. AWH*

Corp., 415 F.3d 1323 (noting courts must "avoid the danger of reading limitations from the specification into the claim"). There is no language in the claim itself that alludes to how the values are calculated or how they are to be interpreted. And as Petitioner points out, the '279 patent specification provides a broader description of the term, by stating that the "resource indication value (RIV) indicat[es] a start resource block and the length of consecutively-allocated resource blocks (RBs)." *Id.* at 13:35–38; Pet. 42; *see also* Reply 4–5 (arguing that the calculation of an invalid RIV value is irrelevant to the claims because the claims do not require any method of calculating such values); Tr. 22:1–23:25 (arguing that a RIV is a value denoting a start resource block and the length of consecutively allocated resource blocks as stated in the '279 patent specification).

Accordingly, we determine that the "Resource Indication Value (RIV)" recited in claims 4 and 14, does not require a RIV calculation method of the type Patent Owner argues.

There are no other terms that the parties dispute and, we do not need to expressly construe any further claim limitations to resolve the controversy before us. *See, e.g.*, *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) ("[W]e 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))).

C. Public Accessibility

Petitioner asserts that Dahlman, Samsung, and Nokia qualify as prior art because each document was published and publicly available on the 3GPP website prior to November 13, 2008, the earliest effective filing date

of the U.S. application for the '279 patent. Pet. 2–3, 10–11 (citing Ex. 1006 ¶ 54; Ex. 1007 ¶¶ 6–48, 52, 60), 16 (citing Lanning Decl. ¶ 116). Petitioner cites the Mullins Declaration for establishing the public availability of Dahlman, and the Bishop Declaration for establishing the public availability of the Samsung and Nokia documents, by describing in detail how a member of the public could access such documents prior to the effective filing date of the '279 patent. Pet. 10–11 (citing Ex. 1006 ¶ 54; Ex. 1007 ¶¶ 6–48, 52, 60); *see also* Ex. 1006 ¶¶ 50–53; Ex. 1007 ¶¶ 49–51, 52–59, 61, 62.

More specifically, Petitioner asserts that Dahlman (Ex. 1003), titled "3G Evolution: HSPA and LTE for Mobile Broadband," qualifies as prior art because it was published and publicly available on August 6, 2008. Pet. 10 (citing the Elsevier database catalog web page for Dahlman). Petitioner further asserts that its expert, Dr. Mullins, "provides a detailed explanation of library publication practices and the dates that publications are available to the public in his declaration" and "verified that Exhibit 1003 is an authentic copy of Dahlman and that Dahlman was publicly available on the bookshelves of the University of Arizona Library by November 4, 2008, at the latest." *Id.* at 10–11 (citing Ex. 1006 ¶ 54). Petitioner next asserts that Nokia qualifies as prior art because it was published by the 3GPP Technical Specification Group for Radio Access Network on or before September 24, 2008, as verified by Petitioner's expert, Mr. Craig Bishop, who "provides a detailed explanation of 3GPP's policies and practices for publishing and making available technical submissions in his declaration." *Id.* at 11 (citing Ex. 1007 ¶¶ 6–48, 52). Petitioner also asserts that Samsung qualifies as prior art because it was published by the 3GPP Technical Specification Group for Radio Access Network on August 12, 2008, as verified by Petitioner's expert, Mr. Bishop. *Id.* at 11 (citing Ex. 1007 ¶ 60).

At the preliminary stage, prior to institution, Patent Owner challenged Petitioner's showing that Dahlman was publicly accessible. Prelim. Resp. 10–11. We disagreed with Patent Owner in our Decision on Institution and preliminarily determined that Dahlman, published by an established publisher, Academic Press, was on the shelves of the University of Arizona by no later than November 4, 2008, which was before the priority date of the '279 patent. Dec. on Inst. 9–11.

Patent Owner reiterates during trial that Dahlman has no date and is "not prior art because it is a book that does not have a release date into circulation, i.e., no specific date of public accessibility." PO Resp. 15. Patent Owner also argues that the testimony of Dr. Mullins is "insufficient to satisfy the clear and convincing standard for the asserted prior art." *Id.*

We do not agree with Patent Owner. For a reference to qualify as a printed publication, "before the critical date the reference must have been sufficiently accessible to the public interested in the art." *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1568 (Fed. Cir. 1988). When there is an established publisher there is a presumption of public accessibility as of the publication date. *Vidstream LLC v. Twitter, Inc.*, 981 F.3d 1060, 1065 (Fed. Cir. 2020); *see also Giora George Angres, Ltd. v. Tinny Beauty & Figure, Inc*., No. 96-1507, 1997 WL 355479, at *7 (Fed. Cir. July 24, 1997) ("[A]s Memoirs was published (in England) by an established publisher, there is no reason to suspect that it was not publicly available, including to one skilled in the art, and no evidence was presented that it was not." (citing *In re Hall*, 781 F.2d 897, 899 (Fed. Cir. 1986)) (emphasis omitted)).

In our Decision on Institution we noted that Dahlman is a book published by Academic Press (an established publisher) with a copyright of

2008 for the second edition, and the record shows a publication date of August 6, 2008, evidenced by the listing on the cited Elsevier catalog. Pet. 10 (citing https://www.elsevier.com/books/3g-evolution/dahlman/978-0-12-374538-5); Ex. 1003). As stated above, when there is an established publisher, as we have here, there is a presumption of public accessibility as of the publication date. *Vidstream,* 981 F.3d at 1065. The evidence that Dahlman was published as of August 6, 2008, and the *Vidstream* presumption have not been rebutted. *See* PO Resp. 15 (arguing that the Dahlman itself shows no publication date, and not addressing the Elsevier catalog proffered by Petitioner). Accordingly, we determine Dahlman is a printed publication with a public accessibility as of the publication date, August 6, 2008.

In any event, even if Dahlman was not publicly accessible by August 6, 2008, the record supports the alternative contention of Petitioner that Dahlman was publicly accessible by November 4, 2008. We credit the testimony of Dr. Mullins, a professional librarian, which details how the date of Dahlman's public *accessibility* was established, including the determination that cataloging at the University of Arizona library was completed by October 25, 2008, and that Dahlman would have been labeled and on the shelf of that library by no later than November 4, 2008. Ex. 1006 ¶¶ 50–51. There is no evidence of record rebutting this testimony or calling into question Dr. Mullins's qualification to testify as to this matter. Thus, we find that Dahlman was publicly accessible by no later than November 4, 2008. The earliest priority of the '279 patent is November 13, 2008, according to Patent Owner. PO Resp. 15. Based on these dates, Dahlman pre-dates the '279 patent and is therefore prior art.

D. Overview of the Asserted References

Petitioner relies primarily on three references as prior art that each teaches various features of the claimed invention. We summarize each reference below.

1. Overview of Dahlman (Ex. 1003)

Dahlman relates to "the evolution of the 3G mobile communication as developed in the 3GPP (*Third Generation Partnership Project*) standardization, looking at the radio access and access network evolution." Ex. 1003, xxix.[6] In relevant part, Dahlman describes various Long Term Evolution (LTE) network concepts including LTE radio interface architecture, downlink and uplink transmission schemes, LTE access procedures, and LTE transmission procedures. *See id.* at 277–546.[7] In an LTE system, the scheduler determines which terminals receive data and on which set of resource blocks. *Id.* at 465. The basic operation is *dynamic* scheduling, where the base station (eNodeB) sends scheduling information in each Transmission Time Interval (TTI) to the selected set of terminals. *Id.* at 465–466. With dynamic scheduling, a new scheduling decision is taken in each subframe, and allows for flexibility in terms of the resources used and large variations in the amount of data to transmit at the cost of the scheduling decision being sent on a physical downlink control channel (PDCCH) in each subframe. *Id.* at 476–477. However, in some services that involve regularly occurring transmission of relatively small payloads, like Voice over IP services, reducing the control signaling overhead is

[6] For consistency with the parties' briefings, we cite to the actual page numbers of Dahlman rather than the corresponding Exhibit page numbers.
[7] These numbers (and all pinpoint cites to Dahlman) refer to the original page numbers of Dahlman.

accomplished in LTE through *semi-persistent* scheduling in addition to dynamic scheduling. *Id.* at 477. Thus, to reduce "the control signaling overhead" a scheduler may use *semi-persistent* scheduling. *Id.* at 466.

With regard to semi-persistent scheduling, Dahlman describes an LTE radio-access architecture in which an eNodeB (base station) sends scheduling information on the PDCCH to one or more terminals (UEs) for controlling uplink and downlink transmission activity. *See, e.g.*, *id.* at 299–301, 313, 331, 465–466; *see also id.* at 312 (describing "physical channels without a corresponding transport channel. . . as Ll/L2 control channels . . . used for downlink control information (DCI), providing the terminal with the necessary information for proper reception and decoding of the downlink data transmission"). Dahlman explains:

> With semi-persistent scheduling, the terminal is provided with the scheduling decision on the PDCCH, together with an indication that this applies to every *n*th subframe until further notice. . . . The periodicity of semi-persistently scheduled transmissions, that is, the value of *n,* is configured by [radio resource control (RRC)] signaling in advance, while activation (and deactivation) is done using the PDCCH.

Id. at 477.

Figure 19.15 of Dahlman is reproduced below.

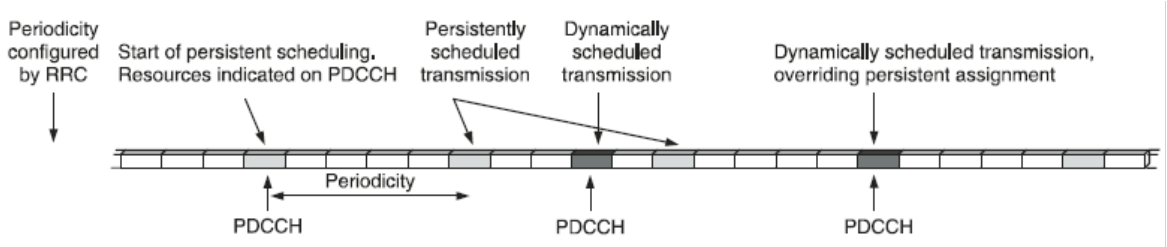

Figure 19.15 of Dahlman depicts an example of semi-persistent scheduling. *Id.* As shown in Figure 19.15, the periodicity of the UE's SPS transmission is configured by RRC, which grants time resources having a particular periodicity (for example, 20 ms). *Id.* Figure 19.15 also shows that the

persistent scheduling resources are indicated on the PDCCH, such that the UE may perform transmissions according to the configured periodicity (for example, every 20 ms). *Id.*

According to Dahlman, "[a]fter enabling semi-persistent scheduling, the terminal continues to monitor the PDCCH for uplink and downlink scheduling commands." *Id.* If a dynamic scheduling command is detected, it takes precedence over the semi-persistent scheduling in that particular subframe. *Id.* Dahlman explains that "for VoIP in parallel with web browsing it may be useful to override the semi-persistent resource allocation with a larger transport block when downloading the web page." *Id.*

Dahlman also describes that the PDCCH may be used to carry one or more formats of downlink control information (DCI) such as scheduling and control commands to provide the terminal (UE) with the necessary information for proper reception and decoding of the downlink data transmission. *Id.* at 312, 338, 340–341, Fig. 16.17. Dahlman explains that "[a] flag in the message is used to inform the terminal whether the message is an uplink scheduling grant (DCI format 0) or a downlink scheduling assignment (DCI format 1A)." *Id.* at 349. Notably, "[t]he information fields of DCI format 1A include[]" a "Resource-block allocation . . . field indicat[ing] the resource blocks upon which the terminal should transmit the PUSCH" and an "Identity (RNTI) of the terminal for which the POSCH transmission is intended [16 bit]." *Id.* at 349–350; *see also id.* at 342–43, 345, Fig. 16.18. Dahlman also describes, in the context of PDCCH processing, that "for normal unicast data transmission, the terminal-specific C-RNTI is used." *Id.* at 352; *see also id.* at 314 ("One or several IP addresses have been assigned to the mobile terminal, as well as an identity

of the terminal, the *Cell Radio-Network Temporary Identifier* (C-RNTI).”), 432, 443–44.

2. Overview of Samsung (Ex. 1005)

Samsung, entitled “SPS resource release,” is a published 3GPP meeting contribution that “proposes to use all 1s in [the] RB assignment field in [an] SPS resource allocation DCI to release the SPS resource.” Ex. 1005, 1. Samsung explains that “[a]ny of the unused code point[s]” in the RB assignment field “could indicate the SPS resource release,” and “[t]o make the relevant text simple, all 1s could be a good candidate.” *Id.* The authors of Samsung also “[n]ote that the proposal is valid for DCI format 0/1A” and “believe the proposal works both for the uplink and for the downlink.” *Id.*

3. Overview of Nokia (Ex. 1004)

Nokia, entitled “Missing details of semi-persistent scheduling,” is a published 3GPP meeting contribution that “discusses some further details of semi-persistent DL and UL scheduling and contains several proposals to complete the specification of semi-persistent scheduling.” Ex. 1004, 1. As an initial matter, Nokia describes the concept of releasing semi-persistent resources by stating that “semi-persistent resources are released explicitly by PDCCH,” and proposing that the “SPS release is sent on PDCCH using SPS C-RNTI and by setting the content of PDCCH (except the CRC) into a known code word, *e.g.*, all bits set to zero.” *Id.* Nokia applies its proposed semi-persistent scheduling technique to user equipment (UE), stating that “[w]hen the UE receives the persistent UL grant, then the UE stores the parameters and is allowed to use these parameters persistently.” *Id.* at 2.

> In the context of UL persistent scheduling, Nokia describes:
>
> As agreed, the persistent scheduling is configured by RRC signalling, i.e., the feature is turned on/off by RRC signalling and the periodicity of the persistent scheduling is given by RRC signalling. The exact timing as well as the resources and transport format parameters are sent on L1/L2 control channel (PDCCH) as normal UL grant (with SPS C-RNTI). If the UL grant is missed (there is no UL transmission), eNB can send it again.

Id. Nokia also describes that "the explicit release sent on PDCCH should be acknowledged by the UE by sending an ACK on UL control channel corresponding to the PDCCH." *Id.* Nokia proposes, in relevant part, that the "UL SPS release is sent on PDCCH using SPS C-RNTI and by setting the content of PDCCH (except the CRC) into a known code word which does not give a valid allocation. For Format 0 the following fields are set to zero: Hopping flag, Resource block assignment . . . ." *Id.*

E. Challenge Based on Dahlman and Samsung

Petitioner contends that the challenged claims would have been obvious over Dahlman and Samsung. Pet. 24–46. For the reasons that follow, we are persuaded that Petitioner has demonstrated by a preponderance of the evidence that claims 1, 3–5, 11, and 13–15 would have been obvious over Dahlman and Samsung.

1. Independent Claims 1 and 11

The Dahlman and Samsung ground turns on whether the combination teaches or suggests the two claimed SPS deactivation conditions: "*the RNTI is a SPS Cell RNTI (SPS C-RNTI)*; and *the first field is entirely filled with '1.'*" Ex. 1001, 26:15–17, 27:13–15 (emphases added). But first, we address the remaining claimed limitations, for which Patent Owner does not present argument.

The Petition sets forth, and we find, that the combination of Dahlman and Samsung teaches the following recitations of claim 1[8]:

a. "A method for deactivating Semi-Persistent Scheduling (SPS) transmission in a wireless mobile communication system": Dahlman teaching SPS deactivation in the context of an LTE system (Pet. 28–29 (citing Ex. 1003, 43, 59–61, 299–301, 433, 441, 477, 495, 505, 563–564, Figs. 4.17–4.19, 15.1, 18.8, 18.13, 24.1; Lanning Decl. ¶¶ 205, 209)); and Samsung teaching deactivation of an uplink SPS allocation in what a person of ordinary skill in the art would understand to be an LTE system, and suggesting the proposal works for both uplink and downlink allocations (*id.* at 30 (Ex. 1005; Lanning Decl. ¶¶ 218, 223–226)). Thus, each of Dahlman and Samsung teaches the recitation of the preamble.[9]

[8] Because claim 11 recites substantially similar limitations, our analysis refers to claim 1, but applies equally to claim 11.
[9] We make this finding notwithstanding that we have not determined that the preamble is a limitation and neither party argues that it is.

b. "performing, by a User Equipment (UE), a SPS transmission at an interval of a subframe period configured by a radio resource control (RRC) signal": Dahlman teaching a UE performing SPS transmission in every *n*th subframe, where the periodicity is configured by RRC signaling. Pet. 30–31 (citing Ex. 1003, 299, 317–318, 477, Figs. 16.2, 19.15; Lanning Decl. ¶¶ 247–249). Petitioner provides an annotated Figure 19.15, reproduced below, that shows an example of semi-persistent scheduling transmission (*id.* at 31):

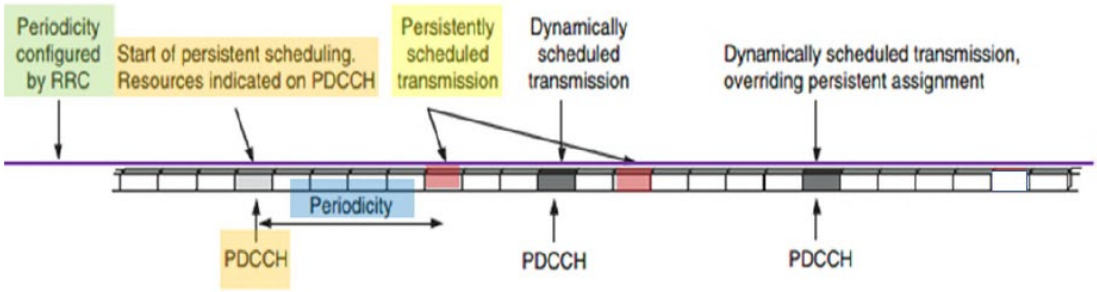

Figure 19.15 *Example of semi-persistent scheduling.*

Figure 19.15 depicts an SPS transmission by the UE in yellow (Persistently schedule transmission) that the RRC configured to occur at a given periodicity (shown in blue). This annotated Figure 19.15 also shows that the frequency resources are received from a PDCCH signal (shown in orange), which activates semi-persistent scheduling. After this activation, the UE transmits (shown in red) as instructed. Each radio frame contains multiple subframes. *Id.* at 32 (citing Lanning Decl. ¶ 248). These explanations in the Petition and by Dr. Lanning are persuasive and we find that Dahlman teaches the claim requirement of a UE performing an SPS transmission at an interval of a subframe period configured by a radio resource control (RRC) signal.

c. "receiving, by the UE, a Physical Downlink Control Channel (PDCCH) signal with a Radio Network Temporary Identifier (RNTI), wherein the PDCCH signal includes a first field related to a resource allocation": Dahlman teaching a PDCCH signal includes DCI, such as for scheduling decisions, where scheduling grants use an RB allocation field (Pet. 33–34 (citing Ex. 1003, 312–313, 338, 477; Lanning Decl. ¶¶ 260–262)), and further teaching including a RNTI in the PDCCH (*id.* at 34–35 (citing Ex. 1003, 312, 318, 342–343, 345, 348–350, Fig. 16.18; Lanning Decl. ¶¶ 263–264)). More specifically, Dahlman describes a downlink scheduling assignment using a DCI format 1A that includes the identity (RNTI) of the terminal for which the PDSCH transmission is intended. Ex. 2003, 349; *see also* Pet. 34–35 (annotating Figure 16.18 showing that for resource allocation type 2, the downlink format DCI 1A is used and the uplink format

DCI 0 is used, which also includes a RNTI). This DCI is transmitted in the PDCCH signal, and the DCI format 0, used for uplink scheduling, contains the RB allocation field. Pet. 33; Lanning Decl. ¶ 262 (testifying that the downlink control information is a first field related to a resource allocation because the grants and power-control commands in the DCI are all examples of resource allocations from the PDCCH); Fig. 16.18 (denoting that for resource allocation type 2, using DCI formats 1A and 0, the resource blocks will be assigned using start/length fields). Accordingly, we are persuaded that Dahlman teaches a PDCCH signal received by the UE, where the signal includes a RNTI and a first field related to a resource allocation.

d. "performing a procedure for deactivating the SPS transmission if the PDCCH signal satisfies conditions for SPS deactivation": Dahlman teaching that the PDCCH provides SPS scheduling decisions, including activation and deactivation. Pet. 35–36 (citing Ex. 1003, 220, 477, Fig. 19.15; Lanning Decl. ¶¶ 270–272, 274). As shown in Figure 19.15, above, the UE continues to transmit "persistently" on the assigned subframes until it receives a deactivation signal in the PDCCH. Ex. 1003, 477 ("activation (and deactivation) is done using the PDCCH"). Petitioner contends, and we agree, that "[t]he UE responds to the deactivation by discontinuing further transmissions using the resources that were allocated for SPS." Pet. 36 (citing Lanning Decl. ¶ 272; Fig. 1915; Ex. 1003, 477). Accordingly, we are persuaded that Dahlman teaches a procedure for deactivating the SPS transmission if the PDCCH signal satisfies

conditions for SPS deactivation—for instance, because Dahlman teaches that deactivation of SPS transmission is signaled using the PDCCH and the UE responds by discontinuing the transmission. However, although this claim limitation recites "conditions," the remaining claim limitations address the specific "conditions" that must be satisfied for SPS deactivation. We analyze below those conditions in connection with the further recited limitations.

e. As stated above, the disputes concerning the Dahlman and Samsung ground concern whether Petitioner has shown sufficiently that the combination teaches the following SPS deactivation conditions: "*the RNTI is a SPS Cell RNTI (SPS C-RNTI)*; and *the first field is entirely filled with '1.'*" We analyze each in turn.

(i) "the RNTI is a SPS Cell RNTI (SPS C-RNTI)"

Regarding the first SPS deactivation condition, Petitioner contends that Dahlman transmits a DCI on the PDCCH that includes the RNTI, as noted above for the "receiving" limitation, and that "[t]he specific RNTI used for signaling purposes of normal unicast transmissions between the base station and UE is the C-RNTI." Pet. 37 (citing Ex. 1003, 314). Further, Petitioner contends that a person of ordinary skill in the art "would have understood that for deactivation, the DCI sent on the PDCCH must include the C-RNTI which would be considered to be an SPS C-RNTI." *Id.* at. 38 (citing Lanning Decl. ¶ 280).

Patent Owner argues that Dahlman does not disclose an SPS C-RNTI. In particular, Patent Owner alleges that Petitioner's expert, Mr. Lanning,

admitted that Dahlman does not disclose an SPS C-RNTI. PO Resp. 28–29 (quoting Ex. 2006, 61:9–63:5) (citing Smith Decl. ¶¶ 107–108). Further, Patent Owner asserts that "Dahlman only refers to C-RNTI for identification of the terminal—nothing else," and "Dahlman never refers to C-RNTI for deactivation." *Id.* at 31 (citing Smith Decl. ¶¶ 117–118). Accordingly, Patent Owner argues, although Dahlman mentions "C-RNTI" a number of times, none of these relate to SPS deactivation, and "a POSITA would not consider the C-RNTI of Dahlman to be a SPS C-RNTI." *Id.* at 31–33 (quoting Ex. 1003, 314, 352, 432, 442–423, 443–444) (citing Smith Decl. ¶¶ 120–122). Patent Owner argues that, outside the knowledge of the '279 patent, there is insufficient evidence in the record to conclude that one of ordinary skill in the art would have used an SPS C-RNTI in the PDCCH for SPS deactivation signaling. *See id.* at 34–36.

In reply, Petitioner argues that, contrary to Patent Owner's allegation, Mr. Lanning did not admit that Dahlman fails to disclose an SPS C-RNTI, and, in any case, that Petitioner did not contend Dahlman expressly teaches an SPS C-RNTI. Reply 19, 22. Rather, Petitioner asserts that Mr. Lanning testified that one of ordinary skill in the art "would understand Dahlman refers to SPS C-RNTI." *Id.* at 20 (citing Ex. 2006, 126:13–20). Specifically, Petitioner argues that Dahlman teaches both the use of a C-RNTI and performing SPS deactivation, and that one of ordinary skill in the art "would have understood that for an active call to be deactivated, the DCI sent on the PDCCH must include the C-RNTI," and that "[t]he SPS C-RNTI is the C-RNTI used for SPS connections." *Id.* at 20–21 (citing Ex. 1003, 314, 477; Lanning Decl. ¶ 280; Ex. 2006, 124:13–16). That is, "[a]ll the C-RNTIs are the same, and the SPS is just used to show 'it's being used now for an SPS connection.'" *Id.* at 21 (quoting Ex. 2006, 124:17–125:3).

We are persuaded that Dahlman suggests to a person of ordinary skill in the art using an SPS C-RNTI in the deactivation of the semi-persistent scheduling. The parties' dispute over whether Dahlman expressly discloses an SPS C-RNTI is immaterial, because Petitioner's ground relies on what Dahlman would have suggested to a person of ordinary skill in the art, reading the reference as a whole. *See* Reply 22 ("Petitioner never argued that Dahlman expressly teaches an SPS C-RNTI.") (citing Pet. 38); Ex. 2006 (Lanning Deposition), 62:22–23 ("I know that Dahlman doesn't specifically say SPS, space, C-RNTI"). Accordingly, we look at the relevant portions of Dahlman that Petitioner relies upon in contending a person of ordinary skill in the art "would have understood that for deactivation, the DCI sent on the PDCCH must include the C-RNTI which would be considered to be an SPS C-RNTI." Pet. 37–38 (citing Ex. 1003, 314, 342, 348–350, 352, 477).

In describing "the transmission of the DCI message on a PDCCH," Dahlman discloses that "the identity of the terminal (or terminals) addressed, that is, the RNTI, is included in the CRC calculation but not explicitly transmitted," and that "for normal unicast data transmission, the terminal-specific C-RNTI is used." Ex. 1003, 352; *see also id.* at 314 ("One or several IP addresses have been assigned to the mobile terminal, as well as an identify of the terminal, the *Cell Radio-Network Temporary Identifier* (C-RNTI), used for signaling purposes between the mobile terminal and the network."). Dahlman also discloses that for "semi-persistent scheduling, the terminal is provided with the scheduling decision on the PDCCH," and that "activation (and deactivation) is done using the PDCCH." *Id.* at 477. Accordingly, Dahlman discloses signaling SPS deactivation using the PDCCH signal, and that DCI messages on the PDCCH include the RNTI, which is a C-RNTI in cases of unicast data transmission. This disclosure,

however, requires making two connections to arrive at the claimed subject matter at issue: 1) that the PDCCH signaling for SPS deactivation includes a RNTI that is a C-RNTI; and 2) that the C-RNTI is an SPS C-RNTI.

First, regarding the use of a C-RNTI for SPS signaling, Mr. Lanning testifies that Dahlman teaches using the PDCCH for downlink control information, including scheduling decisions (Lanning Decl. ¶ 262 (citing Ex. 1003, 313, 338)), and that "Dahlman teaches a DCI format 0 for the uplink scheduling grant, and DCI format 1A for the downlink scheduling grant and each include the RNTI for the UE" (*id.* ¶ 263 (citing Ex. 1003, 312, 318, 342, 345, 348–349, Fig. 16.18)). Mr. Lanning also notes that "[t]he specific RNTI used for signaling purposes of normal unicast transmissions between the BS and UE is the C-RNTI." *Id.* ¶ 279 (citing Ex. 1003, 314, 352). Mr. Lanning ties this testimony on using RNTIs, including the C-RNTI, in the PDCCH to SPS signaling by noting that "Dahlman also teaches that deactivation of SPS is signaled using the PDCCH." *Id.* ¶ 278 (citing Ex. 1003, 477).

Patent Owner's expert, Dr. Smith, opined that "Dahlman's general explanation of RNTIs in data transmissions [does not] provide a framework for a POSITA to draw a meaningful connection between C-RNTI and deactivation." Smith Decl. ¶ 121. But Patent Owner does not specifically explain why Dahlman does not suggest using a C-RNTI when performing SPS signaling on the PDCCH, given Dahlman's disclosure of using the PDCCH for scheduling decisions with DCI formats that include RNTIs and, in particular, C-RNTIs in the case of unicast transmissions. Patent Owner points to no testimony or other evidence that Dahlman's SPS signaling is not accomplished with unicast data transmissions, which Dahlman describes as using C-RNTIs. *See* Ex. 1003, 352.

On balance, we credit the testimony of Mr. Lanning over that of Dr. Smith because it is supported by evidence of record and provides explanation sufficient to understand the relationship between the PDCCH signaling used for SPS deactivation and the content of that signal with respect to the identity of the terminal, the C-RNTI. *See* Lanning Decl. ¶¶ 262–263, 278–280. The proffered testimony of Dr. Smith characterizes Dahlman's disclosures as limited to what it expressly discloses, and not for what they would suggest to a person of ordinary skill in the art. Smith Decl. ¶¶ 115–120. Dr. Smith's testimony also does not explain or rebut the Lanning testimony on which RNTI Dahlman suggests for use in the PDCCH signal for SPS activation and deactivation. *Id.* Indeed, Dr. Smith's testimony is silent as to what Dahlman's teachings of using the PDCCH for SPS activation and deactivation would have taught or suggested to a person of ordinary skill in the art. Merely opining that Dahlman limits its discussion of C-RNTI as an identify of the terminal is insufficient to rebut the testimony of Mr. Lanning that the PDCCH transmits DCI which includes the RNTI and that a person of ordinary skill in the art would understand that for DCI 1A transmission that RNTI would be a C-RNTI. Lanning Decl. ¶¶ 278–280. Thus, Petitioner's position that a person of ordinary skill in the art "would have understood that for deactivation, the DCI sent on the PDCCH must include the C-RNTI" (Pet. 38) is supported by expert testimony that is consistent with Dahlman's teachings. Mr. Lanning's testimony also makes a logical connection between Dahlman's disclosure of using RNTIs, and particularly a C-RNTI, in the DCI (of the PDCCH) and Dahlman's disclosure of using the PDCCH for SPS deactivation signaling (*see* Ex. 1003, 314, 352, 477).

Second, regarding the conclusion that a C-RNTI would be an SPS C-RNTI, in connection with SPS deactivation, Mr. Lanning testified as follows:

> Q. Is one of the types of C-RNTIs an SPS C-RNTI?
>
> A. That is correct for an SPS connection.
>
> Q. So for an SPS connection, you would use a C-RNTI, correct?
>
> A. It would be a – it follows the same rules of a C-RNTI, but they just put the SPS in front of it to imply it's being used now for an SPS connection.
>
> But a C-RNTI would be the same number of bits calculated the same way even if it were being used for something different than an SPS connection.
>
> . . .
>
> Q. . . . So the SPS is just used there to signal that it's for an SPS allocation; is that correct?
>
> A. It would be for an SPS-oriented message and one of those messages would be an allocation, but it could also be a deactivation or an activation signal.
>
> . . .
>
> Q. So would a person of ordinary skill in the art reading [Dahlman] understand that for SPS allocation or de-allocation, you would use an SPS C-RNTI?
>
> . . .
>
> A. I believe they would. Because as I just described that, that's a group of C-RNTIs that are used specifically for semi-persistent scheduling connections.

Ex. 2006, 124:13–126:20.

Patent Owner does not provide persuasive argument based on evidence that rebuts the above quoted testimony. In fact, Patent Owner's expert, Dr. Smith, provided testimony consistent with Mr. Lanning's understanding of an SPS C-RNTI:

> . . . The SPS C-RNTI, as an example of an RNTI, is – can be thought of as just a number or a label.
>
> . . .
>
> And that number I can check to see if that number is the SPS C-RNTI, and if that number is the SPS C-RNTI, I know that that message is intended for me, and that message is intended to be – is related to something to do with SPS.

Ex. 1017, 108:5–19.

Patent Owner asserts that Mr. Lanning relies on information from a Web site that post-dates the '279 patent. *See* PO Resp. 35 (referring to Exhibit 1013, which is printout of a webpage at howltestuffworks.blogspot.com). This Web site information, however, is discussed in a technology overview section of the declaration (*see* Lanning Decl. ¶¶ 33–55). Furthermore, our analysis of Mr. Lanning's testimony and the Petition do not rely on the background LTE information provided as a tutorial on the technology. Rather, we focus on Petitioner's challenge and what Dahlman would have suggested to a person of ordinary skill in the art concerning whether an SPS deactivation signaled on the PDCCH would have suggested the use of a C-RNTI, and further, an SPS C-RNTI (*see* Pet. 37–38; Reply 19–24).

Patent Owner also argues that the 3GPP Release 8 specification cited in our Decision on Institution (*see* Dec. on Inst. 19), and relied on by Mr. Lanning (*see* Lanning Decl. ¶ 68), "does not provide a POSITA with sufficient technical details about mapping SPS C-RNTI on the PDCCH for use in a deactivation procedure." PO Resp. 36 (citing Smith Decl. ¶ 138). At the very least, however, the 3GPP Release 8 specification shows the use of a "Semi-Persistent Scheduling C-RNTI," where, for uplink grants, "[w]hen the UE has a C-RNTI, Semi-Persistent Scheduling C-RNTI, or

Temporary C-RNTI, the UE shall . . . if [PDCCH condition for deactivation of SPS]: - clear the configured uplink grant (if any)." *See* Ex. 1014, 19; *see also id* at 16–17 (disclosing procedures for downlink assignments that include use of a Semi-Persistent Scheduling C-RNTI). This specification involving the use of an SPS C-RNTI lends credence to Mr. Lanning's testimony that Dahlman would have suggested to a person of ordinary skill in the art to use an SPS C-RNTI because that is the type of C-RNTI used specifically for SPS allocation and de-allocation and Dahlman discloses SPS allocation or deallocation using a PDCCH signal. *See* Ex. 2006, 126:13–20.

Finally, we note that there is no contrary evidence of how Dahlman would have operated to deactivate semi-persistent scheduling using signaling in the PDCCH without using an SPS C-RNTI. Petitioner proffered sufficient evidence to explain Dahlman's operation as it would have been understood by a person of ordinary skill in the art and we have been provided no contrary evidence. In Dr. Smith's deposition, when asked "is there any other C-RNTI that you would use to activate or deactivate the SPS other than the SPS C-RNTI?," he answered, "No." Ex. 1017, 109:4–7. Asked differently—"would a person of ordinary skill in the art know that you would use an SPS C-RNTI to activate or deactivate the SPS?"—Dr. Smith answered that "[a] person of skill in the art would know that using a message with the SPS C-RNTI was a possible way to control, including deactivating the SPS." *Id.* at 110:1–8. When Patent Owner was asked at the oral argument why it would not be the case that the C-RNTIs reserved for SPS deactivation would have been "SPS C-RNTIs," Patent Owner essentially pointed to Dahlman's lack of express reference to an "SPS C-RNTI." *See* Tr. 55:21–57:23. But the lack of express disclosure of using an SPS C-RNTI does not amount to evidence that explains how Dahlman

would have operated without using an SPS C-RNTI. Petitioner's challenge is based on what Dahlman would have suggested to one of ordinary skill in the art, not that Dahlman expressly references an "SPS C-RNTI."

Accordingly, we determine, based on the entire record, that Dahlman would have suggested to one of ordinary skill in the art that for the SPS deactivation condition "the RNTI is a SPS Cell RNTI (SPS C-RNTI)," as recited in claim 1.

(ii) "the first field is entirely filled with '1'"

Regarding the second SPS deactivation condition, Petitioner contends that the combination of Dahlman and Samsung teaches "the first field is entirely filled with '1.'" Pet. 38. In particular, Petitioner asserts that "Dahlman teaches the PDCCH's DCI includes several fields, such as the resource allocation field and Samsung discloses setting the field to all 1s." *Id.* (citing Ex. 1003, 348–350, Fig. 16.4.5; Ex. 1005). For a reason to combine the references, Petitioner contends that, given Dahlman's lack of explanation on exactly how SPS deactivation is accomplished, one of ordinary skill in the art "would further look for a way to deactivate the SPS in an efficient manner, with no new signaling needed other than what was already capable of being transmitted as part of the DCI on the PDCCH," and Samsung teaches such a solution. Pet. 26 (citing Lanning Decl. ¶ 173).

Patent Owner argues that "Samsung does not disclose the 'first field' technical details required by the '279 patent for SPS deactivation in claims 1 and 11." PO Resp. 21. Specifically, Patent Owner argues that Samsung only discloses that "all 1s could be a good candidate," which means it "has an unknown, unproven status among other candidates, and that "a POSITA would need the details of the '279 patent's specification to determine any

values for SPS deactivation." *Id.* at 22. Accordingly, Patent Owner argues that one of ordinary skill in the art looking at Samsung would need additional references, including 3GPP specifications, to make the required calculations for a specific value of Samsung's unused code points to use in SPS deactivation. *See id.* at 22–26. Patent Owner further argues that "[a]t best, Samsung is a 'proposal' that does not provide a POSITA with the technical details necessary to fill the RB field of the DCI with all 1s." *Id.* at 27.

In reply, Petitioner argues that Samsung teaches what is required by the disputed limitation, "that a PDCCH resource allocation field be filled entirely with 1s." Reply 13 (citing Ex. 1001, 26:10–11, 26:17). Specifically, Petitioner argues that "Samsung expressly teaches SPS release (*e.g.* deactivation) by filling the RB assignment field with all 1s, exactly the same as described and claimed by the '279 patent." *Id.* (citing Ex. 1005, 1). Petitioner argues Samsung's disclosure that "all 1s could be a good candidate" would lead one to such solution. *Id.* at 15. With respect to Patent Owner's argument that one of ordinary skill in the art would need additional references for calculating unused code points in Samsung, Petitioner argues that the claims do not require finding invalid values of the "first field" (*id.* at 14 (citing Ex. 1001, 26:10, 17; Ex. 2006, 113:15–114:8), and in any case, Petitioner asserts that its expert testified that one could easily determine the unused code points with Samsung's Table 1 (*id.* at 16–17 (citing Ex. 1005, 1; Ex. 2006, 79:9–80:7, 107:17–108:13)). Further, Petitioner asserts this point "is irrelevant because Samsung teaches using all 1s (an invalid value/unused code point) to signal SPS release." *Id.* at 17.

In sur-reply, Patent Owner argues that "the '279 patent's specification teaches that filling the first field entirely with '1' is based on a specific

value, as embodied by the RIV" and that "Petitioners have failed to demonstrate how any combination of [the references] teaches any specific value for SPS deactivation." Sur-reply 5.

We are persuaded that the combination of Dahlman and Samsung teaches "the first field is entirely filled with '1.'" As noted above with respect to the "receiving" limitation, Petitioner sets forth adequate support to show that Dahlman teaches the "PDCCH signal includes a first field related to a resource allocation," as recited in claim 1—namely, the RB allocation field in Dahlman—and Patent Owner presents no specific argument to the contrary. Samsung discloses "a mechanism using a code point of RB assignment field in DCI" in order to perform SPS resource release in which "[a]ny of the unused code point[s] could indicate the SPS resource release." Ex. 1005, 1. In particular, Samsung discloses "all 1s could be a good candidate," and so proposes that "**all 1s in RB assignment field in SPS resource allocation DCI releases the SPS resource currently configured**." *Id.* Samsung further notes that "the proposal is valid for DCI format 0/1A." *Id.* We are also persuaded by Petitioner's argument and evidence that, given Dahlman's lack of explanation on exactly how SPS deactivation is accomplished, one of ordinary skill in the art "would further look for a way to deactivate the SPS in an efficient manner, with no new signaling needed other than what was already capable of being transmitted as part of the DCI on the PDCCH," and that Samsung teaches such a solution and with a reasonable expectation of success. Pet. 26; Lanning Decl. ¶¶ 173–174.

We are not persuaded by Patent Owner's argument that one of ordinary skill in the art would need to perform calculations to determine a specific value for SPS deactivation, and that Samsung does not provide the

technical details necessary to achieve this. *See* PO Resp 21–27. Claim 1 does not require performing any calculations prior to filling the "first field" entirely with 1s. Nor does the claim specify any particular length of the field based on any calculations. Accordingly, we need not settle the parties' dispute as to whether one of ordinary skill in the art would have been capable of *calculating* unused code points in Samsung that could be used as SPS deactivation values, particularly without the use of additional references. *See, e.g.*, PO Resp. 22–23 (asserting that "Petitioner's expert opined that a POSITA would need additional references, such as 3GPP specifications to make any calculations based on the code points"); Reply 13–14 (arguing that "[i]t is a matter of simple subtraction to figure out the invalid points, if that was required"); Ex. 2006, 118:14–22 (Lanning Deposition) (testifying that one of ordinary skill in the art could "use one of multiple methods to determine what those other unused or invalid code points would be").

While the length of an RB allocation field may vary according to the implementation (*see, e.g.*, Ex. 1003, 339 ("The actual message size depends on the cell bandwidth as, for larger bandwidths, a larger number of bits are required to indicate the resource-block allocation.")), we find that one of ordinary skill in the art would have been capable of using Samsung's teaching in Dahlman by simply filling the RB allocation field in a given implementation, whatever its length, with all 1s. Samsung acknowledges that different numbers of resource blocks are used depending on system bandwidth (*see* Ex. 1005, Table 1), and so Samsung's proposal to use all 1s envisions the need for different length fields of 1s. Patent Owner's arguments to the contrary do not show why varying the number of 1s in Dahlman's RB allocation field, depending on system bandwidth, would

require additional teachings, beyond those provided in Dahlman and Samsung, and the knowledge of one of ordinary skill in the art.

We are also not persuaded by Patent Owner's argument that using all 1s has an "unknown, unproven status," and is merely a proposal. PO Resp. 22, 27. Samsung and Dahlman both relate to SPS deactivation, and Samsung teaches a particular way of accomplishing it, namely, by filling the RB assignment field for SPS resource allocation with all 1s. Samsung's statement that "all 1s could be a good candidate" for indicating SPS deactivation does not cut against the use of all 1s, but rather suggests it. As Petitioner's expert testifies, using all 1s would avoid any calculations and be a simple choice. *See* Ex. 2006, 93:11–16 ("So any one of those unused code points could be used to release the SPS resource with the UE and they're just saying to make it simple that, let's just use all ones and not have to figure out which one of these other unused code points we should use."); *see also id.* at 84: ("[Y]ou don't have to calculate anything if you use all ones."). Thus, one of ordinary skill in the art would thus have understood Samsung's teaching of all 1s as a promising way to implement SPS deactivation in Dahlman. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007) ("[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill."). And the record lacks evidence to the contrary or that using all 1s in an RB allocation field as employed for SPS scheduling in Dahlman would have been "uniquely challenging or difficult for one of ordinary skill in the art." *Leapfrog Enterprises, Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007).

Nor does the record show a lack of a reasonable expectation of success in using all 1s. Patent Owner has relied on Dr. Smith's opinion that he would have had doubt that Samsung's solution would have worked because he would have preferred more certainty and more proof. For example, Dr. Smith testified that "[t]his is the worldwide phone system," so "[i]f there's any doubt that all 1s will not work, you can't use it." Ex. 1017, 85:19–20 (Smith Deposition). Further, regarding whether the Samsung authors knew all 1s was an unused code point, Dr. Smith testified that "[t]here's no proof in here, there's no explanation, no derivation, nothing." *Id.* at 86:7–9; *see also id.* at 88:14–17 ("So when I read this Samsung proposal, I am a very long way from knowing that all 1s will always work."). However, "the expectation of success need only be reasonable, not absolute." *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1364 (Fed. Cir. 2007). And, as we have stated above, Petitioner's reasons to combine and Mr. Lanning's testimony in support persuasively convey that the use of all 1s as taught by Samsung would have been expected to work with Dahlman because Samsung uses the same DCI format for signaling the SPS deactivation that Dahlman expressly utilizes. Lanning Decl. ¶ 174. Unused code points would have been those that result in no resource allocation, and, therefore, their use is reasonably suited for how Samsung proposes to signal SPS deactivation. *Id.* Furthermore, Samsung presents its solution as a "simple release mechanism" and that "any of the unused code points could indicate" the release and "all 1s could be a good candidate." Ex. 1005. There is no hesitation or doubt as to the solution offered or whether it would work as intended. And other than Dr. Smith's factually unsupported testimony, there is no evidence of record supporting the contention that Samsung's proposal would not work. Accordingly, we do not credit Dr.

Smith's testimony on whether all 1s would work because it is at odds with Samsung's disclosure.

Again, Samsung states: "Any of the unused code point[s] could indicate the SPS resource release. To make the relevant text simple, all 1s could be a good candidate." Ex. 1005, 1. The context of Samsung's disclosure suggests that all 1s is understood to be one of the unused code points, i.e., it "could be a good candidate" from among "[a]ny of the unused code point[s]." *Id.* Also, the fact that Samsung was a 3GPP member (*see* Ex. 1017, 87:4–6 ("The members that wrote this proposal were members of the 3GPP, correct? A Correct, Samsung, yes, is a member.")) indicates a level of seriousness in the proposal and is itself evidence that one of ordinary skill in the art would have seen the proposal as having a reasonable expectation of success when combined with a functioning 3GPP system, like that described in Dahlman. But, even if one of ordinary skill in the art could reasonably have had doubt as to the success of Samsung's proposal based on whether all 1s was actually an unused code point, Dr. Smith allows that a valid value could possibly be used, in combination with some other technique: "I think what you're asking is, could you use a valid RIV in this scheme for SPS deactivation? And the answer to that is no, not unless you do something else." Ex. 1017, 95:7–10. In other words, even if all 1s were, in the terms of the '279 patent, a valid value (*see, e.g.*, Ex. 1001, 21:30–31 ("[T]he invalid RIVs may be used for an event requesting no RB allocation.")), that would not be an absolute bar against its use for indicating SPS deactivation.

In any case, the fact that 3GPP member Samsung proposed using all 1s for SPS deactivation, labeling it as potentially "a good candidate," is sufficient to show that one of ordinary skill in the art would have tried using

all 1s with a reasonable expectation of success, even if there were no guarantee of creating a flawless system. The record supports Petitioner's contention that one of ordinary skill in the art would have found that the references would have been combined with predictable results, given the common signaling structure. Lanning Decl. ¶ 174. In particular, Samsung describes the proposal to use all 1s as being "valid for DCI format 0/1A," and Dahlman describes using the PDCCH "to carry DCI such as scheduling decisions," including DCI formats 0 and 1A, where SPS "activation (and deactivation) is done using the PDCCH." Ex. 1005, 1; Ex. 1003, 338–339, 477.

Accordingly, we determine, based on the entire record, that the combination of Dahlman and Samsung teaches the SPS deactivation condition that "the first field is entirely filled with '1,'" as recited in claim 1.

(iii) Conclusion as to Claims 1 and 11

We have considered Petitioner's contentions and evidence and Patent Owner's arguments and evidence in opposition, and, on the full record before us, we determine that Petitioner has shown by a preponderance of the evidence that claim 1, and similar claim 11, are unpatentable as obvious over Dahlman and Samsung.

2. Dependent Claims 3 and 13

Claim 3 depends from claim 1 and recites "wherein the PDCCH signal carries a Downlink Control Information (DCI) format '0.'" Ex. 1001, 26:27–28. Claim 13 depends from claim 11 and recites a similar limitation. *Id.* at 27:24–25. Petitioner contends that Dahlman teaches the limitations in claims 3 and 13 by disclosing uplink scheduling grants that use DCI format

0. Pet. 40 (citing Ex. 1003, 348–349, Fig. 16.18). Petitioner further contends that Samsung teaches these limitations by disclosing a proposal valid for DCI format 0. *Id.* at 41 (citing Ex. 1005, 1; Lanning Decl. ¶ 309). Patent Owner does not present argument concerning claims 3 and 13. For the reasons set forth in the Petition, we determine that Petitioner has shown by a preponderance of the evidence that claims 3 and 13 are unpatentable as obvious over Dahlman and Samsung.

3. Dependent Claims 4 and 14

Claim 4 depends from claim 1, and further recites "wherein the first field indicates a Resource Indication Value (RIV)." Ex. 1001, 26:29–30. Claim 14 recites a similar limitation. *Id.* at 27:26–27. Petitioner contends that in Dahlman the resource-block allocation field in the DCI indicates allocations of resource blocks, and, in particular, uses a type of resource-block allocation signaling that specifies a start and a length of the allocated resource blocks. Pet. 42–44 (citing Ex. 1003, 339, 343–346, 349, Fig. 16.18; Lanning Decl. ¶¶ 315–317, 319). Petitioner asserts that, while Dahlman does not expressly use the term "RIV," Dahlman's disclosure meets the limitation of an RIV based on how that term is used in the '279 patent—i.e., as "indicating a start resource block and a length of consecutively allocated resource blocks." *Id.* at 41–42 (citing Ex. 1001, 13:35–40; Lanning Decl. ¶¶ 103, 314).

In the Sur-reply, Patent Owner argues that Petitioner's contentions fail to distinguish between the "first field" of claims 1 and 11 and the "RIV" of claims 4 and 14, where the RIV "is not simply any resource block assignment field." Sur-reply 6–7. Rather, Patent Owner asserts that the claimed "RIV" is a value that is distinct from the RIV field that may contain different RIVs, as explained in the Specification. *See id.* at 7–9 (citing

Ex. 1001, 6:23–25, Table 6, Fig. 17; Smith Decl. ¶ 38; Ex. 1017, 52:2–53:13). According to Patent Owner, the claimed "RIV" requires the calculations described in the Specification because "an RIV cannot exist without them." *Id.* at 5–6. In particular, Patent Owner argues these calculations require determining a RIVmax, which is the maximum valid RIV, because only an invalid RIV can result in SPS deactivation. *See id.* at 9–11. Patent Owner argues Petitioner's contention that Dahlman teaches the claimed "RIV" "appl[ies] an incorrect meaning to RIV that does not properly consider the '279 patent's Specification." *Id.* at 11.

We have determined in connection with claim construction, *supra* Section III.B, that Patent Owner's arguments concerning the scope of the term "Resource Indication Value (RIV)" would require calculations disclosed in the '279 patent. Therefore, we find Patent Owner's arguments concerning this limitation unpersuasive, because they rely on an interpretation of the term that we do not agree with.

Instead, we are persuaded that Dahlman teaches "the first field indicates a Resource Indication Value (RIV)," as recited in claims 4 and 14. The Specification of the '279 patent provides the following: "the resource allocation field may include a resource indication value (RIV) indicating a start resource block and the length of consecutively-allocated resource blocks (RBs)." Ex. 1001, 13:35–38. Dahlman describes the DCI on the PDCCH as being "categorized into different *DCI formats*, where a format corresponds to a certain message size and usage." Ex. 1003, 339. In particular, "DCI format 1A, also known as the 'compact' downlink assignment, supports allocation of frequency-contiguous resource blocks only." *Id.* at 340. Uplink grants in DCI format 0 also use contiguous allocations. *Id.* A common field among the DCI formats is the resource-

block allocation field. *See id.* at 342. Dahlman further describes three different types of signaling for resource-block allocations, where "type 2 supports contiguous allocations only," and is used for DCI formats 1A and 0. *Id.* at 343, Fig. 16.18. "Unlike the other two types of resource-block allocation signaling, type 2 does not rely on a bitmap. Instead, it encodes the resource allocation as *a start position and length of the resource-block allocation*." *Id.* at 346 (emphasis added).

As summarized above, Dahlman's disclosure of type 2 signaling for the resource-block allocation field for certain DCI formats on the PDCCH meets the limitation of a "RIV." That is, type 2 signaling specifies the "start position and length," just as the '279 patent describes a RIV as "indicating a start resource block and the length of consecutively-allocated resource blocks (RBs)." Ex. 1001, 13:36–38. The Petition does not improperly fail to distinguish the claimed "RIV" from the "first field," as Patent Owner argues (Sur-reply 6–7), because Petitioner contends that Dahlman teaches: "the resource block allocation field of the DCI, which is the first field, encodes the resource allocation as a start position and length" (Pet. 44). In other words, Petitioner distinguishes between the field and what it encodes. We agree with Petitioner's contention because one of ordinary skill in the art would understand that some value must fill the resource-block allocation field in Dahlman, and that this value encodes information in a particular way, for example, according to the type 2 signaling. *See* Ex. 1003, 346, Fig. 16.18.

Accordingly, we determine that Petitioner has shown by a preponderance of the evidence that claims 4 and 14 are unpatentable as obvious over Dahlman and Samsung.

4. Dependent Claims 5 and 15

Claims 5 depends from claim 1 and recites "continuing, by the UE, the SPS transmission if the PDCCH signal does not satisfy the conditions for SPS deactivation." Ex. 1001, 26:32–34. Claim 15 depends from claim 11 and recites a similar limitation. *Id.* at 27:29–30. Petitioner contends Dahlman teaches that SPS grants "are available until the base station notifies the UE that they are no longer available," and so, "if the UE does not receive a PDCCH signal that satisfies the conditions for SPS deactivation, it would continue the SPS transmission." Pet. 45–46 (citing Ex. 1003, 477, Fig. 19.15; Lanning Decl. ¶¶ 327–328). Petitioner further contends "Samsung teaches that if the UE does not receive a PDCCH signal that satisfies the conditions for SPS deactivation, it would continue the SPS transmission." *Id.* at 46 (citing Ex. 1005, Title, Introduction; Lanning Decl. ¶ 334). Patent Owner does not present argument concerning claims 5 and 15. For the reasons set forth in the Petition, we determine that Petitioner has shown by a preponderance of the evidence that claims 5 and 15 are unpatentable as obvious over Dahlman and Samsung.

5. Conclusion of Dahlman and Samsung Ground

We have addressed above Petitioner's challenge based on the combination of teachings of Dahlman and Samsung. We have determined that Petitioner has demonstrated by a preponderance of the evidence that challenged claims 1, 3–5, 11, 13–15 are unpatentable for obviousness over Dahlman and Samsung.

F. Challenge Based on Nokia and Samsung

Petitioner contends that the challenged claims would have been obvious over Nokia and Samsung. Pet. 47–62. For the reasons that follow, we are persuaded that Petitioner has demonstrated by a preponderance of the

evidence that claims 1, 3–5, 11, and 13–15 would have been obvious over Nokia and Samsung.

1. Independent Claims 1 and 11

The Nokia and Samsung ground turns on whether Samsung teaches the second claimed condition for SPS deactivation, i.e., "the first field is entirely filled with '1.'" Ex. 1001, 26:15–17, 27:13–15. For this limitation, Petitioner relies on Samsung in similar fashion as for the Dahlman and Samsung ground—i.e., Petitioner contends Samsung teaches "the first field is entirely filled with '1'" by disclosing the use of all 1s in the RB assignment field for SPS deactivation. Pet. 58. Patent Owner presents the same arguments against Petitioner's reliance on Samsung in combination with Nokia as discussed above for the Dahlman and Samsung ground. *See* PO Resp 21–28; Sur-reply 4–5. Those arguments are unpersuasive when considered in the context of the Nokia and Samsung ground for similar reasons as discussed above, but we provide the following additional analysis.

Nokia describes a proposal in which "SPS release is sent on PDCCH using SPS C-RNTI and by setting the content of PDCCH into a known code word, e.g., all bits set to zero," specifically, "a known code word which does not give a valid allocation." Ex. 1004, 1. As noted above, Samsung discloses setting the RB assignment field in the DCI to all 1s to indicate SPS release. Ex. 1005, 1. Petitioner contends, and we agree, that one of ordinary skill in the art would have been motivated to perform the simple substitution of Samsung's all 1s in the RB assignment field for Nokia's setting multiple bit fields in the PDCCH to zero. Pet. 51 (citing Lanning Decl. ¶ 198).

We also find that one of ordinary skill in the art would have been capable of combining Samsung's teaching with Nokia by filling the resource

block assignment field with all 1s. Nokia and Samsung both relate to SPS release, and simply disclose different techniques for performing this function. Nokia sets multiple fields to zero, including the resource block assignment field (Ex. 1004, 2), while Samsung sets just the RB assignment field to all 1s (Ex. 1005, 1). All that would be required in Petitioner's combination would be to change the values used for SPS release in Nokia's proposal from zeros in multiple fields to all 1s in the resource block assignment field. *See* Lanning Decl. ¶ 198.

Further, we find that one of ordinary skill in the art would have had a reasonable expectation of success in this combination given the common signaling structure in Nokia and Samsung. *See* Ex. 1004, 1–2 ("For Format 1A the following fields are set to zero: . . ."; "For Format 0 the following fields are set to zero: . . ."); Ex. 1005, 1 ("[T]he proposal is valid for DCI format 0/1A"). And, as discussed above with respect to the Dahlman and Samsung ground, we find Samsung suggests that all 1s is understood to be one of the unused code points. *Supra* III.E.1.ii. Based on this understanding, one or ordinary skill in the art would have reasonably expected all 1s in the resource block assignment field to function properly to signal SPS release where Nokia's proposal relies on "a known code word which does not give a valid allocation." Ex. 1004, 1. Moreover, we are persuaded by the reasons to combine proffered by Petitioner, which stand unrebutted, that Samsung's technique serves as an improvement because it "only requires setting a single bit field (the RB assignment field) of the PDCCH to a particular value to indicate deactivation rather than adjusting multiple bit fields of the PDCCH." Pet. 51.

In addition to Patent Owner's arguments that are common to the Dahlman and Samsung ground, Patent Owner argues that "Petitioners'

argument surrounding Nokia is based on the following premise: all 0s is an invalid code," but that, in fact, "all 0s is a valid code." PO Resp. 16 (citing Smith Decl. ¶¶ 50–53); Sur-reply 13–14. We do not agree that Petitioner's argument is based on the premise that 0s would be an invalid code word. Instead, the argument is that Nokia suggests using "a known code word which does not give a valid allocation," and that all 1s, as in Samsung, would be such a code word. *See* Pet. 47–48. Thus, Patent Owner's arguments focusing on whether the "0s" would be a valid code are unpersuasive.

We further agree with Petitioner that "a POSA would have understood that there were a finite number of code words that could be used for deactivation, and each would have been obvious to try." *Id*. (citing Lanning Decl. ¶ 192). The record expressly provides that 1s would have been a "good candidate"—thus providing an actual proposal with a value that Samsung states would be an "unused code point." Ex. 1005 (stating also that the proposal would be valid for DCI format 0/1A and for both the uplink and for the downlink). We conclude, therefore, that the evidence persuasively shows that a person of ordinary skill in the art would have been motivated to try the implementation of all 1s (one of the finite unused code points) as taught in Samsung for purposes of indicating SPS deactivation because all 1s was known to be an unused code point and Samsung recommends it as a "good candidate" for signaling SPS deactivation. *See* Lanning Decl. §§ 192–196.

Patent Owner does not specifically argue the other claimed limitations, and we briefly address them here. The Petition sets forth, and

we find, that the combination of Nokia and Samsung teaches the following limitations of claim 1[10]:

a. "A method for deactivating Semi-Persistent Scheduling (SPS) transmission in a wireless mobile communication system": Nokia teaching deactivating an SPS transmission in what one of ordinary skill in the art would have understood to be an LTE system (Pet. 52–54 (citing Ex. 1004, 1–2; Lanning Decl. ¶¶ 211, 213, 214, 216)); Samsung teaching the preamble for the same reasons presented for the Dahlman and Samsung ground (*see id.* at 54).

b. "performing, by a User Equipment (UE), a SPS transmission at an interval of a subframe period configured by a radio resource control (RRC) signal": Nokia teaching the configuration of persistent scheduling by RRC signaling with the exact timing "sent on L1/L2 control channel (PDCCH) as normal UL grant (with SPS C-RNTI)," where one of ordinary skill in the art would have understood that a "UE performs a transmission based on the grant at an interval of a subframe period," so "[w]hen the RRC turns the SPS on and grants the periodicity, it is creating a grant that allows the UE to perform an uplink transmission at an interval . . . of a subframe period." Pet. 54–55 (citing Ex. 1004, 2; Lanning Decl. ¶ 253).

c. "receiving, by the UE, a Physical Downlink Control Channel (PDCCH) signal with a Radio Network Temporary Identifier (RNTI),

[10] Because claim 11 recites substantially similar limitations, our analysis refers to claim 1, but applies equally to claim 11.

wherein the PDCCH signal includes a first field related to a resource allocation": Nokia teaching the PDCCH using a RNTI, where the PDCCH includes a resource block assignment field. Pet. 56–57 (citing Ex. 1004, 2; Lanning Decl. ¶ 267).

d. "performing a procedure for deactivating the SPS transmission if the PDCCH signal satisfies conditions for SPS deactivation": Nokia teaching deactivating an SPS transmission if the PDCCH includes a known code word set to an invalid allocation. Pet. 57 (citing Ex. 1004, 1–2; Lanning Decl. ¶ 275).

e. "wherein the conditions for SPS deactivation include: the RNTI is a SPS Cell RNTI (SPS C-RNTI)": Nokia teaching SPS release with the PDCCH using an SPS C-RNTI. Pet. at 58 (citing Ex. 1004, 2; Lanning Decl. ¶ 282).

We have considered Petitioner's contentions and evidence and Patent Owner's arguments and evidence in opposition, and, on the full record before us, we determine that Petitioner has shown by a preponderance of the evidence that claim 1, and similar claim 11, are unpatentable as obvious over Nokia and Samsung.

1. Dependent Claims 3 and 13

Petitioner contends that Nokia teaches the limitations in claims 3 and 13 by disclosing "[f]or Format 0 the following fields are set to 0," where a person of ordinary skill in the art would understand Format 0 to be DCI Format 0. Pet. 59 (quoting Ex. 1004, 2) (citing Lanning Decl. ¶ 307). Petitioner further contends Samsung teaches these limitations for the same

reasons provided with respect to the Dahlman and Samsung ground. *Id.* Patent Owner does not present argument concerning claims 3 and 13. For the reasons set forth in the Petition, we determine that Petitioner has shown by a preponderance of the evidence that claims 3 and 13 are unpatentable as obvious over Nokia and Samsung.

2. Dependent Claims 4 and 14

Petitioner contends that although Nokia does not explicitly disclose RIVs, Nokia discloses that the SPS is allocated on the PDCCH. Pet. 60–61; Lanning Decl. ¶ 322. According to Petitioner, Nokia teaches that the RB assignment field is a field of the PDCCH, so that Nokia teaches that the "first field" indicates an RIV as recited in claims 4 and 14. Pet. 61; Ex. 1004, 2 ("For format 0 the following fields are set to zero . . . Resource block assignment . . . ."). Mr. Lanning opines, and we agree, that Nokia's disclosure of format 0 sent on the PDCCH combined with the knowledge of a person of ordinary skill in the art that the resource block (RB) assignment field is part of the DCI in the PDCCH, teaches that the RB assignment field indicates an RIV. Lanning Decl. ¶ 323 (citing Ex. 1015 and explaining that the resource allocation for the PDCCH DCI format 0 is a resource allocation field in the scheduling grant that consists of an RIV corresponding to a starting block and a length in terms of contiguously allocated resource blocks).

For the Nokia and Samsung combination, Patent Owner argues that Samsung does not disclose the RIV limitation of dependent claims 4 and 14. PO Resp. 21–28. Petitioner, however, has relied on Nokia as teaching the limitation further recited in claims 4 and 14, and Patent Owner has not presented argument challenging Petitioner's reliance on Nokia.

Accordingly, we determine that Petitioner has shown by a preponderance of the evidence that claims 4 and 14 are unpatentable as obvious over Nokia and Samsung.

3. Dependent Claims 5 and 15

Petitioner contends that Nokia teaches the limitations in claims 5 and 15 by disclosing "that if the SPS release is not acknowledged by the UE, the base station still needs to wait to make sure the UE does not send further SPS transmissions," where a reason for an SPS release not to be acknowledged "is that the PDCCH signal did not satisfy the conditions for SPS deactivation." Pet. 62 (citing Ex. 1004, 2; Lanning Decl. ¶ 332). Petitioner further contends that Samsung teaches these limitations for the same reasons provided with respect to the Dahlman and Samsung ground. *Id.* Patent Owner does not present argument concerning claims 5 and 15. For the reasons set forth in the Petition, we determine that Petitioner has shown by a preponderance of the evidence that claims 5 and 15 are unpatentable as obvious over Nokia and Samsung.

4. Conclusion of Nokia and Samsung Ground

We have addressed above Petitioner's challenge based on the combination of teachings of Nokia and Samsung. We have determined that Petitioner has demonstrated by a preponderance of the evidence that challenged claims 1, 3–5, 11, 13–15 are unpatentable for obviousness over Nokia and Samsung.

IV. CONCLUSION

Having reviewed the argument and supporting evidence of record, and after a full and fair hearing, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 1, 3–5, 11, and 13–15 are

unpatentable as obvious over Dahlman and Samsung and also as obvious over Nokia and Samsung.[11] We do not reach the other grounds of unpatentability for these same claims based on obviousness over Nokia alone and obviousness based on Dahlman, Samsung, and Nokia. *SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding a petitioner "is entitled to a final written decision addressing all of the claims it has challenged"); *Bos. Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App'x. 984, 990 (Fed. Cir. 2020) (non-precedential) (recognizing that the "Board need not address issues that are not necessary to the resolution of the proceeding" and, thus, agreeing that the Board has "discretion to decline to decide additional instituted grounds once the petitioner has prevailed on all its challenged claims").

[11] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 3–5, 11, 13–15	103(a)	Dahlman, Samsung	1, 3–5, 11, 13–15	
1, 3–5, 11, 13–15	103(a)	Nokia, Samsung	1, 3–5, 11, 13–15	
1, 3–5, 11, 13–15	103(a)[12]	Nokia		
1, 3–5, 11, 13–15	103(a)[13]	Dahlman, Samsung, Nokia		
Overall Outcome			1, 3–5, 11, 13–15	

V. ORDER

In consideration of the foregoing, it is hereby

ORDERED that claims 1, 3–5, 11, 13–15 of the '279 patent are determined to be unpatentable;

FURTHER ORDERED that because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

[12] We do not address whether the challenged claims are obvious under this additional ground because we have determined those same claims unpatentable under another ground.
[13] *See supra* n.12.

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