

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AT&T SERVICES INC., T-MOBILE USA, INC.,
CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS,
ERICSSON, INC., AND
NOKIA OF AMERICA CORPORATION

Petitioners

v.

ASUSTEK COMPUTER INC.

Patent Owner

Patent No. 10,951,359

**PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT 10,951,359**

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PETITIONERS' EXHIBIT LIST

Exhibit No.	Description
Ex-1001	U.S. Patent 10,951,359 (“the ’359 patent”)
Ex-1002	Declaration of Dr. Zygmunt Haas
Ex-1003	Curriculum Vitae of Dr. Zygmunt Haas
Ex-1004	U.S. Patent No. 10,945,251 (“Nogami”)
Ex-1005	U.S. Patent No. 11,025,456 (“Chatterjee”)
Ex-1006	3GPP TS 38.213 v15.2.0 (2018-06), “3rd Generation Partnership Project; Technical Specification Group Radio Access Network; NR; Physical layer procedures for control (Release 15) (“3GPP-Specification”)
Ex-1007	Declaration of Craig Bishop
Ex-1008	U.S. Patent Publication No. 2018/0324770 (“Nogami-770”)
Ex-1009	“CORESET Configuration and search space design,” Huawei, HiSilicon, 3GPP TSG RAN WG1 Meeting #90bis, Prague, Czech Republic, Oct. 9-13, 2017) (“Huawei-CORESET”)
Ex-1010	File history of U.S. Patent 10,951,359
Ex-1011	File history of U.S. Prov. App. No. 62/619,041 (“Huang-prov”)
Ex-1012	File history of U.S. Prov. App. No. 62/586,378 (“Nogami-provisional”)
Ex-1013	File history of U.S. Prov. App. No. 62/617,106 (“Chatterjee-provisional”)
Ex-1014	International Publication No. WO2019/099388 (“Nogami-PCT”)
Ex-1015	June 21, 2022 Interim Procedure for Discretionary Denials in AIA Post-grant Proceedings with Parallel District Court Litigation
Ex-1016	Docket Control Order (Dkt. 52) in <i>ASUS Technology Licensing Inc. v. AT&T Inc.</i> , No. 2:23-CV-486 (E.D. Tex. Feb. 16, 2024)
Ex-1017	Order (Dkt. 13) in <i>Innovative Sonic Limited et al v. AT&T Inc. et al</i> , No. 2:23-cv-00489 (E.D. Tex. Feb. 9, 2024)
Ex-1018	3GPP TS 38.213 v15.0.0 (2018-12), “3rd Generation Partnership Project; Technical Specification Group Radio Access Network; NR; Physical layer procedures for control (Release 15)
Ex-1019	NTT Docomo, Inc., “Summary of key aspects for search space,” 3GPP TSG RAN WG1 Meeting 90bis, Prague, CZ, Oct. 9-13, 2017, R1-1718834 (“NTT”)
Ex-1020	File history of U.S. Prov. App. No. 62/501,494 (“Nogami-770-prov”)

I. INTRODUCTION

AT&T Services Inc., T-Mobile USA, Inc., Cellco Partnership d/b/a Verizon Wireless, Ericsson, Inc., and Nokia of America Corporation (collectively, “Petitioners”) petition for *inter partes* review (“IPR”) seeking cancellation of claims 1–4, 6-9, 11-14, 16-19, and 21-23 (the “Challenged Claims”) of U.S. Patent No. 10,951,359 (“’359 patent”) (Ex-1001), assigned to Asustek Computer Inc. (“Patent Owner”) according to USPTO records.

The Challenged Claims are drawn to nothing more transmitting a signal including a duration and a bitmap, and not transmitting the signal in certain conditions. There are *no other actions* claimed in the two independent method claims—just transmitting the signal, and sometimes not transmitting it—and claim 22, directed to a network node, recites conventional components such as a control circuit, processor, and memory implementing the same functionality. One condition is claimed in claim 1 and independent claim 22, and another condition is claimed in independent claim 12. But as discussed below, the claimed signal with the duration and bitmap were well-known features of 5G wireless technology, and both claimed conditions were also known.

All the claimed features of the Challenged Claims, were disclosed or suggested in the prior art discussed herein, so the Challenged Claims are unpatentable and should be canceled.

II. GROUNDS FOR STANDING

Pursuant to 37 C.F.R. § 42.104(a), Petitioners certify that the '359 patent is available for IPR, and that they are not barred or estopped from requesting IPR on the grounds identified herein. Neither Petitioners, nor any party in privity with Petitioners: (i) have filed a civil action challenging the validity of claims of the '359 patent; (ii) have been served a complaint alleging infringement of the '359 patent more than one year prior to the present date; or (iii) are estopped from challenging the claims on the grounds identified in the petition. The Challenged Claims also have not been the subject of a prior IPR or a finally concluded district court litigation.

III. OVERVIEW OF THE CHALLENGE

A. Claims for Which Review Is Requested (37 C.F.R. § 42.104(b)(1))

Petitioners request the review and cancelation of the Challenged Claims of the '359 patent.

B. Statutory Grounds of Challenge (37 C.F.R. § 42.104(b)(2))

Ground 1: Claims 1-3, 6-9, 11, and 22-23 are obvious under 35 U.S.C. § 103 based on Nogami (Ex-1004).

Ground 2: Claims 4, 12-14, 16-19, and 21 are obvious under § 103 based on Nogami in view of Chatterjee (Ex-1005) and NTT (Ex-1019).

Ground 3: Claims 1-4, 6-9, 11-14, 16-19, and 21-23 are obvious under § 103 based on Nogami in view of 3GPP-Specification (Ex-1006).

C. The Asserted References Are Prior Art to the '359 Patent

The '359 patent, which issued from U.S. Patent Application No. 16/241,368 (“’368 application”) filed January 7, 2019, purports to claim the benefit of U.S. Provisional Application No. 62/619,041 (“’041 provisional”) filed January 18, 2018. Ex-1001, 1:9-12, Cover. For purposes of Grounds 1 and 2 of this Petition, Petitioners assume that January 18, 2018 is the priority date for the '359 patent, without conceding the priority date. Because this date is after March 16, 2013, the AIA version of 35 U.S.C. § 102 applies in this proceeding. *Penumbra, Inc. v. Rapidpulse, Inc.*, IPR2021-01466, Paper 34 at 30 (Mar. 10, 2023) (precedential). Under the AIA, for prior-art determinations, “a reference patent document need only meet the ministerial requirements of [35 U.S.C.] §§ 119 and 120, and the provisional or other application(s) to which the reference patent document claims a right of priority must describe the subject matter relied upon in the reference patent document as prior art.” *Penumbra*, IPR2021-01466, Paper 34 at 32.

Petitioners’ first ground is based on Nogami in view of the knowledge of a POSITA. Nogami issued from U.S. App. No. 16/190,626, filed on November 14, 2018 as a continuation of PCT/US2018/060776 (“Nogami-PCT”), filed November 13, 2018, which claims priority to U.S. Provisional Application No. 62/586,378 (Ex-1012) (“Nogami-provisional”), filed November 15, 2017. Ex-1004, Cover, 2 (codes

(21), (22), (60), (63)). Nogami qualifies as prior art under at least 35 U.S.C. §§ 102(a)(2) and 102(d)(2).

Nogami also meets the procedural requirements for claiming priority to Nogami-PCT. Nogami and Nogami-PCT show that Nogami-PCT designated the United States, Nogami-PCT was filed during the pendency of Nogami-provisional, and Nogami provides a specific reference to Nogami-PCT. Ex-1014, Cover (codes (22), (30), (81)); Ex-1004, Cover, 2 (codes (60), (63)). Nogami also meets the ministerial requirements for claiming priority to Nogami-provisional because it properly claims the benefit of Nogami-provisional, Nogami-PCT was filed during the pendency of Nogami-provisional, and the applications share common inventors. Ex-1014, Cover (codes (22), (30), (72)); Ex-1004, Cover (codes (22), (60), (63), (72)); Ex-1012, 1 (listing inventors).

Petitioners' second ground combines Nogami with Chatterjee (Ex-1005) and NTT (Ex-1019). Chatterjee issued from U.S. App. No. 16/246,407, filed on January 11, 2019 and claiming priority to, *inter alia*, U.S. Provisional Application No. 62/617,106 (Ex-1013) ("Chatterjee-provisional"), filed January 12, 2018. Ex-1005, Cover, 2 (codes (21), (22), (60)). Chatterjee qualifies as prior art under at least 35 U.S.C. §§ 102(a)(2) and 102(d)(2).

Chatterjee also meets the ministerial requirements for claiming priority to Chatterjee-provisional because it properly claims the benefit of Chatterjee-

provisional, Chatterjee was filed during the pendency of Chatterjee-provisional, and the applications share common inventors. Ex-1004, Cover (codes (22), (60), (72)); Ex-1013, 1 (listing inventors).

The relevant subject matter of Nogami and Chatterjee relied upon in this Petition is fully supported by Nogami-provisional and Chatterjee-provisional, respectively, and this Petition provides parallel citations (below at Section VII) to Nogami-provisional and Chatterjee-provisional. *Penumbra*, IPR2021-01466, Paper 34 at 32-34.

Ground 2 also relies on NTT as a secondary reference. NTT qualifies as prior art under at least § 102(a)(1). As explained by Craig Bishop, NTT is a printed publication publicly available at least as early as October 9, 2017. *Infra* Section VII.A.4.b; Ex-1007.

Petitioners' third ground introduces 3GPP-Specification—a technical specification published as part of the 5G standard—as a secondary reference. As explained by Craig Bishop, 3GPP-Specification is a printed publication publicly available by June 29, 2018. *Infra* Section VII.A.3.b; Ex-1007.

As explained below in Section V, the full scope of the “interval” between two bit positions as claimed in independent claims 1, 12, and 22 (and thus all the Challenged Claims) includes the difference between the bit positions, and also the number of bits between the bit positions. The Challenged Claims are not entitled to

claim priority to January 18, 2018 because their full scope is not fully supported by the '041 provisional. Ex-1002, ¶¶20-23.

In order for a claim in a U.S. utility application to be entitled to the benefit of the filing date of an earlier filed provisional application, the subject matter of the claim must be disclosed in the provisional application in accordance with the written description requirement of 35 U.S.C. § 112. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1382 (Fed. Cir. 2015). Here, that requirement is not met for any of the Challenged Claims because they all recite an “interval,” whose full scope is not supported by the written description of the '041 provisional.

Specifically, regarding the “interval” claimed in independent claims 1, 12, and 22, the specification discloses that “[a]n interval or distance between two bit positions could be a number of bits between the two bit positions...[or] [a]lternatively, an interval or distance between two bit positions could be difference of the two bit positions.” Ex-1001, 16:42-49. But the '041 provisional only discloses that “[a]n interval or distance between two bit positions is [the] number of bit[s] between the two bit positions”—without disclosing anything about a difference of the two bit positions. Ex-1011, 46 (internally paginated as 28).

To comply with the written description requirement, the specification or earlier-filed application “must describe the invention sufficiently to convey to a person of skill in the art that the patentee had possession of the claimed invention at

the time of the application, i.e., that the patentee invented what is claimed.” *LizardTech, Inc. v. Earth Resource Mapping, Inc.*, 424 F.3d 1336, 1345 (Fed Cir. 2005); *see also Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997); *Allergan, Inc. v. Sandoz Inc.*, 796 F.3d 1293, 1308-09 (Fed. Cir. 2015). “[T]he test requires an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art [(‘POSITA’)].” *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). Whether the added subject matter is an obvious variant of the disclosed subject matter is irrelevant. *Lockwood*, 107 F.3d at 1572.

A POSITA (as described below in Section VI) reviewing the ’041 provisional would not have understood that the named inventors were in possession of the subject matter recited in claims 1 and 12 of the ’359 patent at the full scope of the claimed “interval,” namely, including the possibility of the claimed “interval” between two bit positions being the *difference* of the two bit positions. Ex-1002, ¶22. Therefore, the subject matter of claim 1 at its full scope is not disclosed in the ’041 provisional in accordance with the written description requirement.

Accordingly, the earliest effective filing date for the ’359 patent at the full scope of the term “interval” is January 7, 2019, which is the filing date of the ’368 application that issued as the ’359 patent. *See also infra* Section V. Therefore,

3GPP-Specification qualifies as prior art to the '359 patent under at least 35 U.S.C. § 102(a)(1).

Petitioners do not concede that the Challenged Claims are adequately supported with respect to all other claim terms, and reserve the right to present invalidity defenses under 35 U.S.C. § 112—which cannot be presented in the present IPR—in other proceedings.

IV. OVERVIEW OF THE '359 PATENT

A. Background of the '359 Patent

The '359 patent describes a “control resource set” (CORESET) (Ex-1001, 1:47-48) used for wireless communications. Ex-1002, ¶¶52-56. Dr. Haas explains that a CORESET occupies a region in the time-frequency plane, with some number of symbols in the time domain and some number of physical resource blocks (PRBs) in the frequency domain. Ex-1002, ¶¶52-56. The '359 patent acknowledges that it was known to use a CORESET to indicate (1) time duration (duration in number of OFDM symbols) and (2) a bitmap indicating at least a starting OFDM symbol for monitoring the CORESET in a time slot. *Id.*, ¶¶55-56.

B. The '359 Patent's Disclosure

The '359 patent states that “if a bit map indicates a starting OFDM symbol belonging to the following OFDM symbol(s) of previous starting OFDM symbol indicated by the bit map (e.g., time duration of a CORESET is 2 and the bit map is

1100000000000000), a UE may be confused about the configuration.” Ex-1001, 15:56-61. The ’359 patent further states that “if the bit map indicates a starting OFDM symbol on the last few OFDM symbols of a slot, this may create a problem where the CORESET may be configured across a slot boundary,” and provides an example where “time duration of a CORESET is 2 and the bit map is 000000000000001.” *Id.*, 15:63-16:17; Ex-1002, ¶¶57-59.

C. Prosecution History of the ’359 Patent

The Examiner initially rejected the claims as being anticipated by (or for some claims, as being obvious over) the reference that is submitted here as Ex-1009 (“Huawei-CORESET”). Ex-1010, 244-249. After a few rounds of prosecution, the Examiner allowed the claims, stating in the Notice of Allowance that Huawei-CORESET “does not disclose the limitation *not allowing to transmit the signal such that an interval between any two bit positions with the value of one in the set of bit positions in the bit map is smaller than the first duration* as recited in claims 1, 13, and 24, and argued in the Remarks.” *Id.*, 158 (emphasis in original). Importantly, there is no evidence that the Examiner was aware of the prior art identified in this Petition. Ex-1002, ¶¶60-61. And, as explained in detail below in Sections VII.A.1 and VII.B.1, Nogami (relied upon for single-reference obviousness in Ground 1, and the primary reference for Ground 2) discloses or suggests ***precisely what the Examiner found lacking in the prior art.*** Additionally, the above limitation is not

even recited in one of the independent claims (claim 12, numbered as 13 at the time of the Notice of Allowance). The Examiner would not have allowed the application over the prior art relied upon herein.

V. CLAIM CONSTRUCTION

As explained in 83 Fed. Reg. 51341 (Oct. 11, 2018), the Board construes the Challenged Claims according to the standard as set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). Below, Petitioners construe one term (“interval”) appearing in each independent claim and various dependent claims. Petitioners believe that, for the purposes of this proceeding and the analysis presented herein, no other claim term requires express construction in order to resolve the present patentability dispute. *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999). Accordingly, this Petition analyzes the remaining terms of the Challenged Claims consistent with the ordinary and customary meaning as would be understood by one of ordinary skill in the art in light of the specification. *Phillips*, 415 F.3d at 1314–17; Ex-1003, ¶¶46-51.

A. “interval”

The term “interval,” which is recited in independent claims 1, 12, and 22, and dependent claims 3-5, 9, 10, 14, 15, 19, and 20, should be construed as “the difference between two bit positions or the number of bits between two bit positions.” Ex-1002, ¶¶48-51.

This construction is supported by the claim language. *Id.*, ¶49. For example, the “interval” recited in the independent claims encompasses the foregoing two options, as shown by dependent claims 9 and 19 (both reciting “the interval is the difference between two bit positions”) and dependent claims 10 and 20 (both reciting “the interval is [the] number of bits between two bit positions”). The claims do not specify any other options for the “interval,” and none of the claims are inconsistent with Petitioners’ construction. *Id.*

The above construction is also supported by the specification. *Id.*, ¶50. The specification discloses that “[a]n interval or distance between two bit positions could be a number of bits between the two bit positions” and further discloses that “[a]lternatively, an interval or distance between two bit positions could be difference of the two bit positions.” Ex-1001, 16:42-49. Those are the only two options for the “interval,” according to the specification. Ex-1002, ¶¶50-51. And, the scope of “interval” cannot be narrower than Petitioners’ construction (e.g., cannot encompass only one of the above two options), because the specification describes both options. *Id.* Furthermore, the dependent claims (e.g., claims 9 and 10, or equivalently, claims 19 and 20) make clear that the independent claims must encompass both options. *Id.*

But the ’041 provisional only discloses that “[a]n interval or distance between two bit positions is [the] number of bit[s] between the two bit positions”—without disclosing anything about a difference of the two bit positions. Ex-1011, 46

(internally paginated as 28). Therefore, the '041 provisional does not support “interval” as properly construed to its full scope. Ex-1002, ¶¶21-22; *see also supra* Section III.C (discussing insufficient support in '041 provisional for full scope of “interval”).

VI. POSITA

A person of ordinary skill in the art (“POSITA”) related to the '359 patent would possess: the equivalent of an undergraduate degree in Electrical Engineering, Computer Science, or Computer Engineering; familiarity with the relevant 3GPP standards as of this time; and at least two years of experience in research, design, development, and/or testing of cellular networks. Ex-1003, ¶¶44-45.¹ Furthermore, an individual could qualify as a POSITA with more technical education (e.g., a PhD in Electrical Engineering, Computer Science, or Computer Engineering) and less professional experience or *vice versa. Id.*

¹ Petitioners submit the declaration of Dr. Haas (Ex-1002), an expert in the field of the '359 patent. (Ex-1002, ¶¶1-45; Ex-1003.)

VII. REASONS FOR THE RELIEF REQUESTED UNDER 37 C.F.R. §§ 42.22(A)(2) AND 42.104(B)(4)

A. Overview of the Prior Art

1. Nogami

Nogami is the primary reference in Grounds 1-3 and is described in detail in Dr. Haas' declaration. Ex-1002, ¶¶62-67. Nogami discloses that a base station sends radio resource control (RRC) configuration information to a UE. Ex-1004, 2:49-59; Ex-1002, ¶¶62-63. Nogami discloses using CORESET technology for resource configuration, including disclosing that the base station (gNB) sends CORESET duration and bitmap information to the UE, with the bitmap including information regarding monitoring for the presence of control information called PDCCH. Ex-1002, ¶¶64-67. Nogami discloses a situation in which adjacent PDCCH monitoring occasions are designated by the bitmap overlap:

[I]f the CORESET duration is more than 1 OFDM symbol and at least if any of two adjacent bits of the CORESET-monitor-DCI-symbolPattern are set to "1", PDCCH monitoring occasions starting with OFDM symbols indicated by those two bits *partially overlap*.

Ex-1004, 30:60-64; Ex-1012, ¶[00117].²

² Emphasis added unless indicated otherwise.

Nogami describes “several ways to handle [such] overlapping” (Ex-1004, 30:64-65), and explains that “[t]he first approach is that the UE 102 is *not expected to be configured with the CORESET-monitor-DCI-symbolPattern which causes overlapping* between adjacent PDCCH monitoring occasions for a same search space set.” *Id.*, 30:65-31:2; Ex-1012, ¶¶00117]; Ex-1002, ¶67.

1. Chatterjee

Chatterjee is a secondary reference in Ground 2 and is described in detail in Dr. Haas’ declaration. Ex-1002, ¶¶68-69. Chatterjee discloses that “the allocated symbols do not cross the slot-boundary.” Ex-1005, 17:47-58; Ex-1002, ¶69. Chatterjee further explains that in a situation where a slot boundary would be crossed by a certain group of symbols, “such a transmission may need to be postponed.” Ex-1005, 22:29-46; Ex-1002, ¶69.

2. 3GPP-Specification

a. Overview of 3GPP-Specification

3GPP-Specification is a 3GPP Technical Specification that is part of the 5G / 3GPP 38.213 standard. 3GPP-Specification describes and specifies various aspects of the 38.213 standard, including CORESET-related details, as explained by Dr. Haas in his declaration. Ex-1002, ¶¶70-73.

b. 3GPP-Specification Qualifies as Prior Art to the '359 Patent Under At Least 35 U.S.C. § 102(a)(1)

As explained in detail by Craig Bishop (Ex-1007), 3GPP technical specifications (TS), including *3GPP TS 38.213 v.15.2.0* (3GPP-Specification), are publically accessible as of the date they were uploaded to 3GPP's FTP server. Ex-1007, ¶¶19-53. Indeed, at least one PTAB panel has found that this is true of all 3GPP documents:

TR 33.821 and TS 23.401,³ *like all 3GPP documents*, were generated with intent to distribute them to interested members of the telecommunications industry. They were uploaded to 3GPP's FTP server without restriction or expectation of confidentiality, and were indefinitely maintained there. They have been available for downloading (copying) from the FTP server since being uploaded, and can be shared with others without restriction. *Under such circumstances, the documents are publicly accessible.*

³ Like *3GPP TS 38.213*, "TS 23.401" is a type of 3GPP document called a technical specification (TS) that was prepared and published by 3GPP. *See, e.g., <https://www.3gpp.org/specifications>; see also* Ex-1007, ¶¶26-40 (describing various categories of documents published by 3GPP as part of standard development, including technical reports and specifications).

Samsung Elecs. Co., Ltd. v. Huawei Techs. Co., Ltd., IPR2017-01487, Paper 45 (Final Written Decision), 2018 WL 6519544, *5 (P.T.A.B. Dec. 10, 2018).

3GPP-Specification was uploaded to 3GPP’s file server on June 29, 2018. Ex-1007, ¶¶54-60. As a result, 3GPP-Specification became a “printed publication” under AIA 35 U.S.C. § 102(a)(1) on June 29, 2018. *See, e.g., Samsung Elecs. Co.*, 2018 WL 6519544, *3–5 (concluding that technical reports and specifications uploaded to 3GPP’s file server before a challenged patent’s priority date qualify as prior art under 35 U.S.C. § 102). 3GPP-Specification thus qualifies as prior art to the ’359 patent at least under AIA 35 U.S.C. § 102(a)(1).

3. NTT

a. Overview of NTT

NTT is a 3GPP working group meeting document that describes various issues relating to 5G/3GPP wireless communication, as explained by Dr. Haas. Ex-1002, ¶74.

b. NTT Qualifies as Prior Art to the ’359 Patent Under At Least 35 U.S.C. § 102(a)(1)

As explained in detail by Craig Bishop (Ex-1007), 3GPP temporary documents, including technical contributions such as NTT (Ex-1019), are publically accessible as of the date they were uploaded to 3GPP’s FTP server (Ex-1007, ¶¶19-53), and as noted above (*supra* Section VII.A.3.b) at least one PTAB panel has found that this is true of all 3GPP documents. NTT was uploaded to 3GPP’s file server on

October 9, 2017. Ex-1007, ¶¶61-65. As a result, NTT became a “printed publication” under § 102(a)(1) on October 9, 2017. NTT thus qualifies as prior art to the ’359 patent at least under § 102(a)(1).

B. Ground 1: Claims 1-3, 6-9, 11, and 22-23 Are Obvious in View of Nogami

1. Claim 1

a. “A method of a network node, the method comprising:”

To the extent that the preamble is limiting, Nogami discloses a method of a network node. Ex-1002, ¶¶75-76; *infra* Sections VII.B.1.b-e (remaining elements of this claim). For example, Nogami discloses that a base station (“network node”) sends radio resource control (RRC) configuration information to a user equipment (UE). Ex-1004, 2:49-59 (“A base station is described. The base station includes a higher layer processor configured to send a first radio resource control (RRC) configuration...”); *see also id.*, Title, FIG. 1, 4:15-17, 5:8-32, FIGS. 3, 5; Ex-1012, 2 (Title), FIGS. 1, 3, 5, ¶¶[0002], [0007], [0012]-[0013]; Ex-1002, ¶75.⁴

⁴ Citations herein to the specification of Nogami-provisional are with respect to the numbered paragraphs of the originally-filed specification beginning at page 13 of Ex-1012.

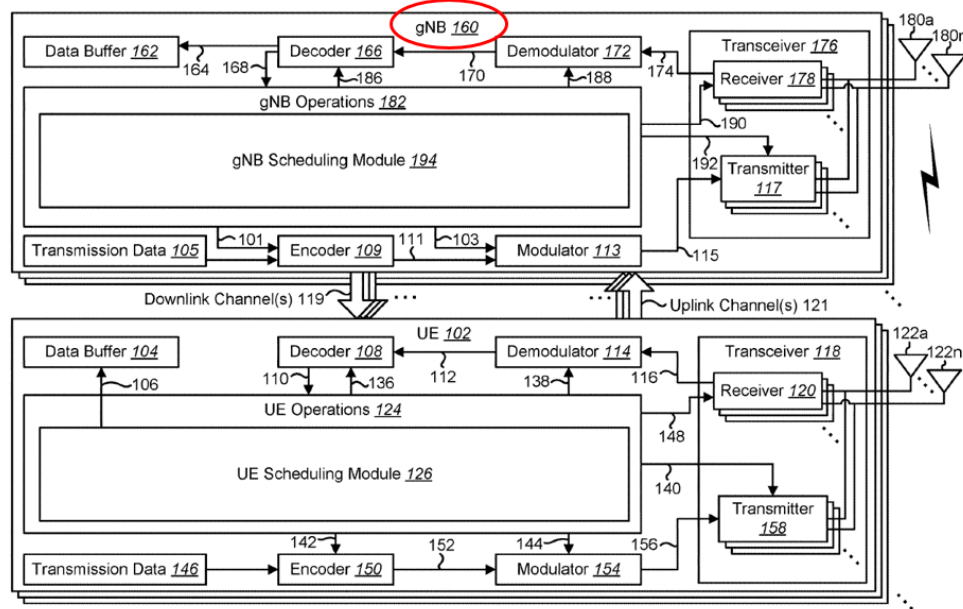


FIG. 1

Ex-1004, FIG. 1 (annotated); Ex-1002, ¶75.

This mapping of “network node” is consistent with the ’359 patent. Ex-1001, Abstract, 15:18-22, 20:65-67; Ex-1002, ¶76.

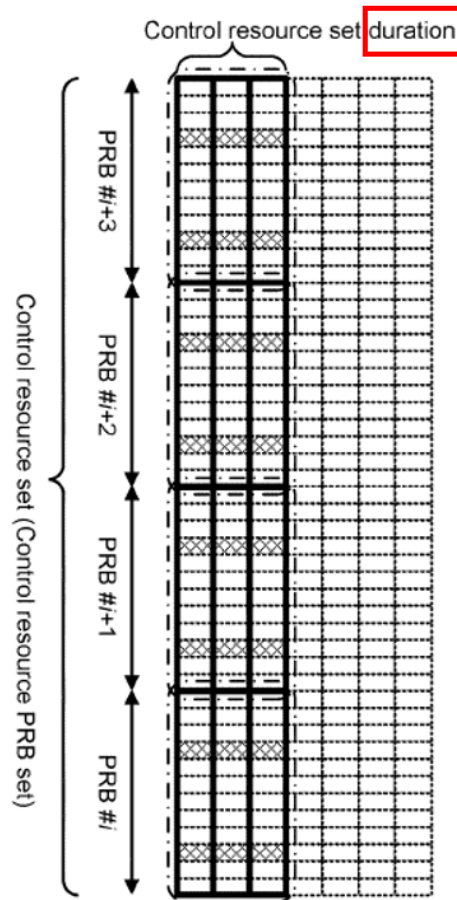
b. “transmitting a signal indicating at least a first duration and a bit map,”

Nogami discloses or suggests this limitation. Ex-1002, ¶¶77-79. Nogami discloses that a base station transmits a signal indicating a control resource set (CORESET) duration (“first duration”) and a bitmap:

The base station includes a higher layer processor configured to *send a first radio resource control (RRC) configuration* including first information for *indicating a* control resource set (CORESET) *duration*, and to *send second RRC configuration including second information* for indicating physical downlink control channel (PDCCH) monitoring symbols. ... The

CORESET duration may be set to a value larger than 1. The *second information may be bitmap information*. Each bit of the bitmap information may correspond to a respective OFDM symbol in a slot. The bit of which value is set to 1 may indicate a start of a PDCCH monitoring occasion.

Ex-1004, 2:49-63; *see also id.*, Abstract, 26:50-54, FIG. 14; Ex-1012, ¶¶[0002], [00110]-[00116], FIGS. 16-17, Ex-1002, ¶77, ¶¶52-56 (explaining CORESET and PDCCH).



Ex-1004, FIG. 14 (annotated); Ex-1012, FIG. 14; Ex-1002, ¶77.

Thus, Nogami's base station sends the second information that is the bitmap information, and hence *transmits* the claimed signal. Ex-1004, 2:49-54; Ex-1012, ¶[0002]; Ex-1002, ¶78.

c. “wherein the first duration is time duration of a control resource set (CORESET), and”

Nogami discloses or suggests this limitation, as explained above for limitation 1(b). *Supra* Section VII.B.1.b; Ex-1002, ¶80. For example, Nogami discloses that the duration is a “control resource set (CORESET) duration.” Ex-1004, Abstract, FIG. 14, 29:28-29, 30:60; Ex-1012, ¶¶[0093]-[0094], [00116]; Ex-1002, ¶80.

d. “wherein the bit map includes a set of bit positions, where each bit position has a value of one or zero and each bit position with the value of one indicates a starting Orthogonal Frequency Division Multiplexing (OFDM) symbol of a monitoring occasion of the CORESET within a slot; and”

Nogami discloses or suggests this limitation, as explained above for limitation 1(b). *Supra* Section VII.B.1.b; Ex-1002, ¶¶81-82. For example, Nogami discloses with respect to Figure 17 that:

[t]he higher layer parameter *CORESET-monitor-DCI-symbolPattern* per search space set may consist of *14 bits, the 1st bit to 14th bit which correspond to OFDM symbol #0 to #13, respectively. Each of the bits indicates whether or not PDCCH is monitored on the corresponding OFDM symbol* (e.g. “0” indicates no PDCCH monitoring and “1” indicates PDCCH monitoring, or vice versa). In this example, the higher layer

parameters *CORESET-monitor-DCI-symbolPattern* for search space set #2 indicates OFDM symbols #0 and #7 for PDCCH monitoring, ...

Ex-1004, 29:54-67; Ex-1012, ¶[00113].

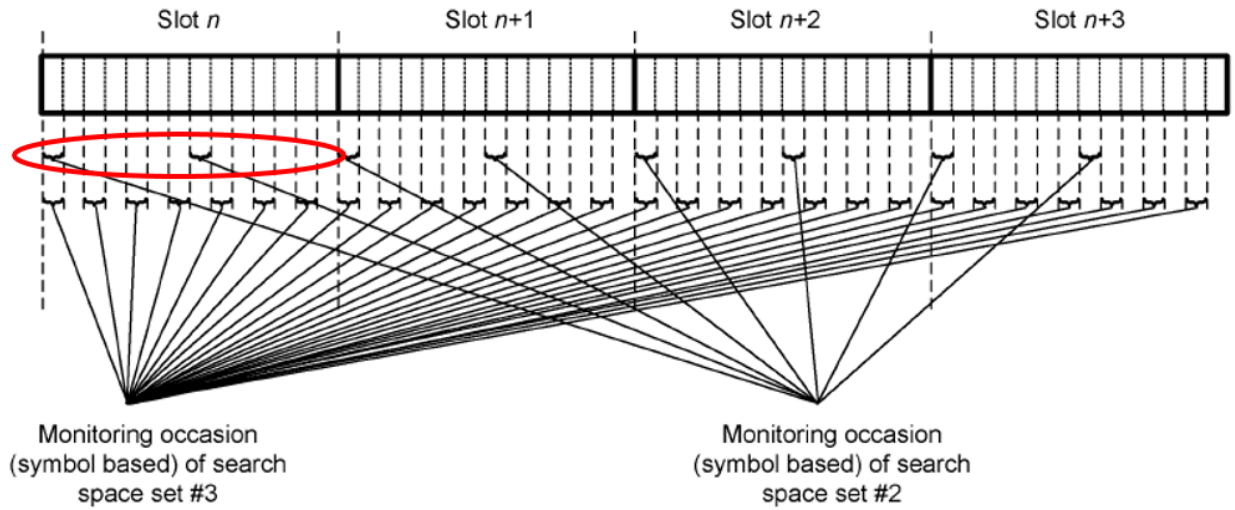


FIG. 17

Ex-1004, FIG. 17 (annotated in red to show which bits are ‘1’ for search space set #2); Ex-1012, FIG. 17; Ex-1002, ¶81.

Thus, each bit position with the value of ‘1’ (e.g., the 1st and 8th bit positions of the bitmap 10000001000000 for search space set #2, where the 1st bit position is the most significant bit) indicates a starting OFDM symbol of a monitoring occasion of the CORESET within a slot. Ex-1002, ¶82.

- e. **“not allowing to transmit the signal such that an interval between any two bit positions with the value of one in the set of bit positions in the bit map is smaller than the first duration.”**

Nogami in view of the knowledge of a POSITA discloses or suggests this limitation. Ex-1002, ¶¶83-92. Nogami describes an example of its bitmap and duration:

For example, the ***CORESET-time-duration is set to 2 OFDM symbols*** and the third bit of the CORESET-monitor-DCI-symbolPattern is set to “1”, the UE 102 may have to monitor PDCCH candidates which are mapped on the ***third and fourth OFDM symbols***. In other words, each bit of the CORESET-monitor-DCI-symbolPattern set to “1” ***may indicate the starting symbol of one or more consecutive OFDM symbol(s)*** on which PDCCH candidate(s) are mapped.

Ex-1004, 30:51-69; Ex-1012, ¶[00116].

Thus, a ‘1’ bit in the bitmap indicates a starting symbol, and the duration is used to determine additional symbol(s), for checking for potential presence of PDCCH (e.g., check the 3rd and 4th symbols in the example above). Ex-1002, ¶84. A POSITA would have understood that if another monitoring occasion overlaps with the above monitoring occasion (e.g., if the bitmap also indicates checking the 4th and 5th symbols, such that there is overlap at the 4th symbol), such an overlap situation is described in Nogami as explained below, and a POSITA would have sought to avoid such a situation. *Id.*, ¶84.

A POSITA would have known that a CORESET is a mechanism for conveying certain control information, such as in the Physical Downlink Control Channel (PDCCH). *Id.*, ¶85 (citing Ex-1008, ¶¶[0113]-[0115], [0263]-[0266]; Ex-1020, ¶¶[0108]-[0110], [0248]-[0251]; Ex-1004, 26:46-52).⁵ An example of a CORESET is shown below, here occupying four physical resource blocks (PRBs) in the frequency domain and three downlink (DL) slots in the time domain:

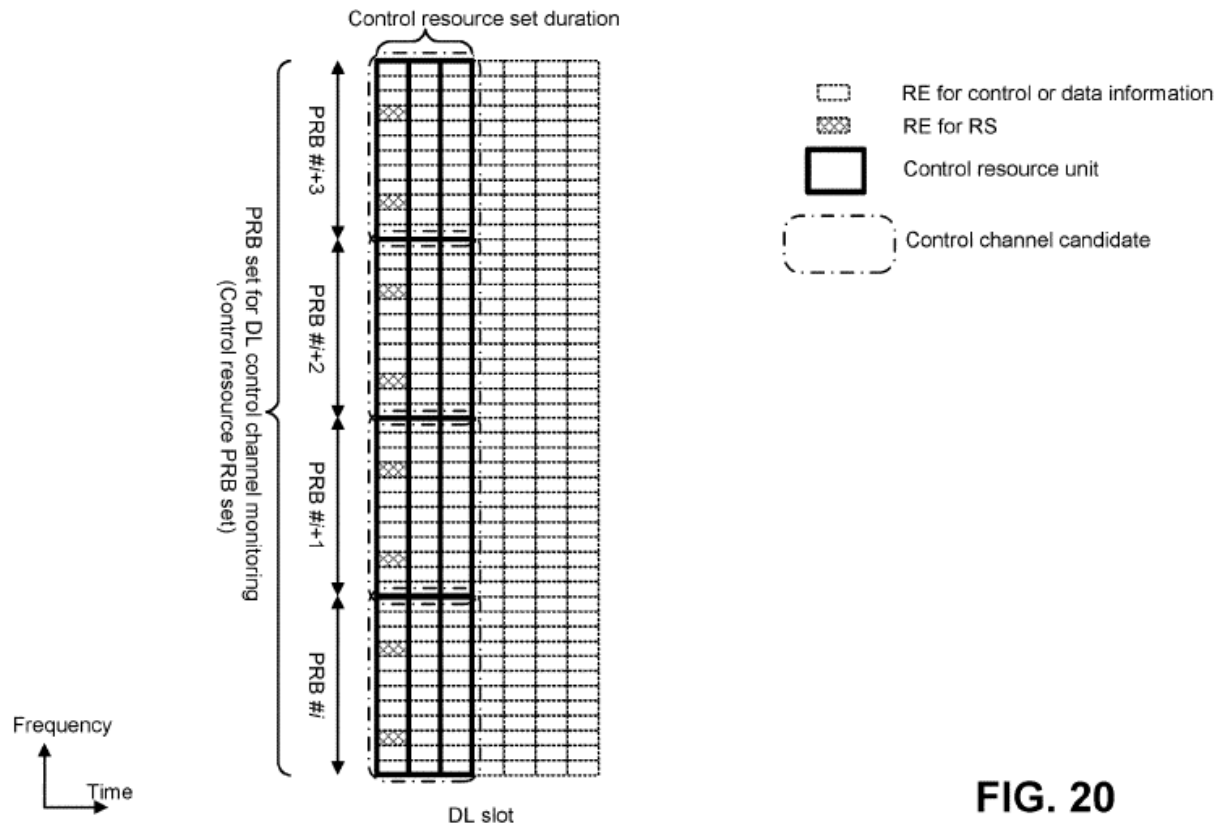


FIG. 20

Ex-1008, FIG. 20; Ex-1020, 23 (FIG. 20).

⁵ Nogami-770 (Ex-1008) is cited to demonstrate knowledge of a POSITA.

A POSITA would have known that downlink refers to transmission of data from base stations (e.g., gNBs) to UEs. Ex-1002, ¶86 (citing Ex-1008, ¶[0070]; Ex-1020, ¶[0065]; Ex-1004, 4:12-16; Ex-1012, ¶[0007]). The PDCCH is a channel used to transmit downlink control information (DCI). Ex-1008, ¶¶[0078], [0114], [0263]; Ex-1020, ¶¶[0073], [0109], [0248]; Ex-1002, ¶86.) A POSITA would have known that “a control resource set (CORESET) is, in the frequency domain, a set of PRBs within which the UE 102 attempts to blindly decode downlink control information (i.e., monitor downlink control information (DCI)).” Ex-1008, ¶[0113]; *see also id.*, ¶[0264]; Ex-1002, ¶86.

A POSITA would have further known that a UE monitors PDCCH in CORESETs. Ex-1008, ¶[0264] (“The UE 102 may monitor PDCCH in one or more control resource sets.”); *see also id.*, ¶¶[0263], [0266]; Ex-1020, ¶¶[0248]-[0249], [0251]; Ex-1002, ¶87. For example, Figure 17 of Nogami shows two examples of search space sets, and in one of those (called search space set #3) the OFDM symbols at which PDCCH monitoring occurs are symbols #0, #2, #4, #6, #8, #10, and #12 (there are 14 symbols in each slot):

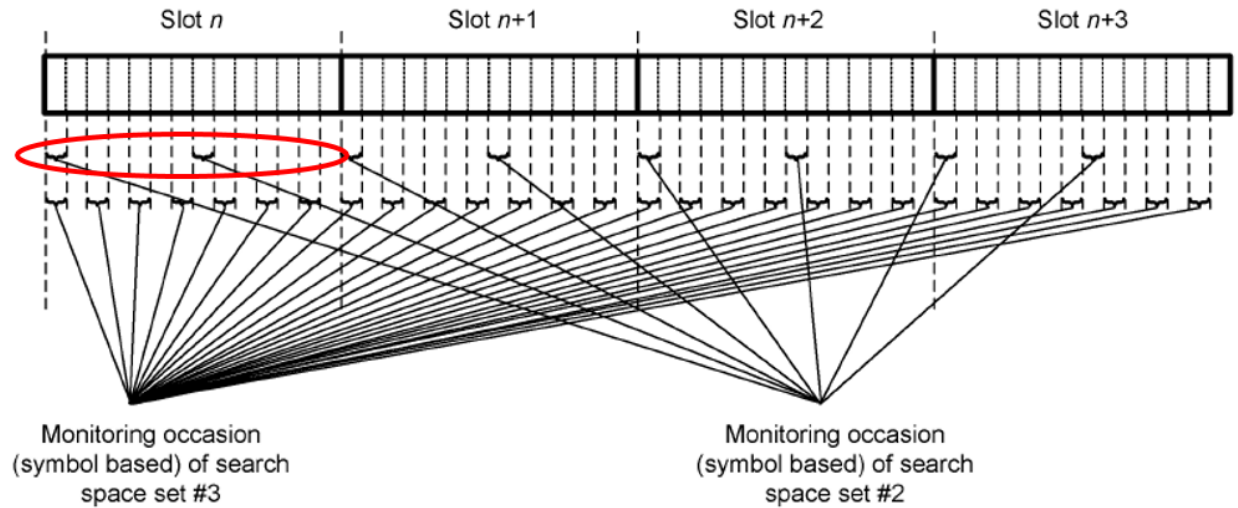


FIG. 17

Ex-1004, FIG. 17 (annotated); *see also id.*, 29:49-67; Ex-1012, FIG. 17, ¶¶[00112]-[00113]; Ex-1002, ¶87.

Nogami notes that in the above example, the CORESET bitmap (called CORESET-monitor-DCI-symbolPattern) “consist[s] of 14 bits, the 1st bit to 14th bit which correspond to OFDM symbol #0 to #13, respectively,” where “[e]ach of the bits indicates whether or not PDCCH is monitored on the corresponding OFDM symbol (e.g. [‘0’] indicates no PDCCH monitoring and ‘1’ indicates PDCCH monitoring...).” Ex-1004, 29:54-61; Ex-1012, ¶[00113]. In the example of search space set #3 which “indicates OFDM symbols #0, #2, #4, #6, #8, #10, #12 for PDCCH monitoring” (Ex-1004, 29:64-67; Ex-1012, ¶[00113]), a POSITA would have understood that the bitmap is 10101010101010. Ex-1002, ¶88. In other words,

the 1st bit (most significant bit) having value ‘1’ indicates monitoring for PDCCH beginning at symbol #0, the 3rd bit having value ‘1’ indicates monitoring for PDCCH beginning at symbol #2, etc. *Id.* (citing Ex-1004, Abstract (“The bit of which value is set to 1 indicates a start of a PDCCH monitoring occasion.”); Ex-1012, ¶[00113]. The CORESET duration is some number of symbols—e.g., Nogami discloses that “[t]he CORESET duration is set to a value larger than 1,” and provides an example duration of three symbols. Ex-1004, Abstract, 29:28-29; Ex-1012, ¶[00111].

Nogami discloses a situation in which adjacent PDCCH monitoring occasions designated by the bitmap overlap:

[I]f the CORESET duration is more than 1 OFDM symbol and at least if any of two adjacent bits of the CORESET-monitor-DCI-symbolPattern are set to “1”, PDCCH monitoring occasions starting with OFDM symbols indicated by those two bits *partially overlap*.

Ex-1004, 30:60-64; Ex-1012, ¶[00117].

This potential for overlap is important enough that Nogami provides guidance right at the start of the specification’s Detailed Description section, *in each of the first four paragraphs of that section*, about the overlap scenario. Ex-1004, 2:46-48, 2:63-65, 3:13-15, 3:30-32. And when Nogami describes “several ways to handle [such] overlapping” (Ex-1004, 30:64-65), Nogami explains that “[t]he first approach is that the UE 102 is *not expected to be configured with the CORESET-monitor-*

DCI-symbolPattern which causes overlapping between adjacent PDCCH monitoring occasions for a same search space set.” *Id.*, 30:65-31:2; Ex-1012, ¶[00117].

Thus, Nogami discloses that its signal may have an overlap situation such that an interval between any two bit positions with the value of one in the set of bit positions in the bit map is smaller than the first duration. Ex-1002, ¶¶89-91.

To the extent Nogami’s guidance about the overlap situation does not explicitly disclose *not allowing to transmit* the signal such that an interval between any two bit positions with the value of one in the set of bit positions in the bit map is smaller than the first duration, it would nevertheless have been obvious in view of the knowledge of a POSITA to modify Nogami’s process to implement this feature. Ex-1002, ¶92. A POSITA would have understood that it would be inappropriate for the base station (gNB) to transmit such configurations in the first place, at least because such transmissions (1) would not be accepted by UE and would waste the transmission bandwidth, (2) would waste UE processing time, and (3) depending on UE design, might confuse the UE. *Id.* Because it was known that a base station (gNB) transmits PDCCH, a POSITA would have found that *not allowing the base station to transmit* a signal indicating a bitmap corresponding to an overlap situation would have been a predictable and simple way to avoid the problem (noted in Nogami) of the UE having to deal with overlapping monitoring occasions. *Supra*

Section VII.B.1.b; Ex-1004, 2:49-55; Ex-1012, ¶[00137]; Ex-1008, ¶[0266]; Ex-1020, ¶[0251]; Ex-1002, ¶92.

In other words, if the base station never transmits (due to not being allowed to transmit) a signal that corresponds to an overlap situation, then the UE (which performs blind decoding of PDCCH candidates based on the received signal) will never have to deal with the above-discussed problem of overlap. Ex-1002, ¶92. A POSITA would have had the capability to implement the above approach, because a POSITA would have known how to implement transmission or non-transmission of various signals. *Id.* Therefore, a POSITA would have had a reasonable expectation of success regarding such an implementation.

2. Claim 2

- a. **“The method of claim 1, wherein the network node is not allowed to transmit the signal indicating that the first duration is 2 and the bit map is 11000000000000.”**

Nogami discloses or suggests this limitation. Ex-1002, ¶93. As discussed above for limitation 1(e), it would have been obvious in view of Nogami and the knowledge of a POSITA to implement *not allowing the base station* (“network node”) *to transmit* a signal such that an interval between any two bit positions with the value of one in the set of bit positions in the bit map is smaller than the first duration. *Supra* Section VII.B.1.e. The features recited in claim 2—first duration is 2, and bitmap is 11000000000000—are just one instance of the general condition

recited in limitation 1(e). For the bitmap 11000000000000, the interval between the 1st and 2nd bit positions (which have the value of ‘1’) is 1 (because 2-1=1) or alternatively 0 (because there are no bits between them), and that is smaller than the duration of 2. Ex-1002, ¶93. So for the same reasons that a POSITA would have found claim 1 obvious in view of Nogami, a POSITA would have also found claim 2 obvious in view of Nogami. *Id.* Indeed, claim 2 falls squarely within the overlap situation noted by Nogami regarding “if the CORESET duration is more than 1 OFDM symbol and at least if any of two adjacent bits of the CORESET-monitor-DCI-symbolPattern are set to ‘1’.” Ex-1004, 30:60-64; Ex-1012, ¶[00117]; Ex-1002, ¶93.

3. Claim 3

- a. **“The method of claim 1, wherein the interval between two bit positions in the set in the bit map shall be larger than or equal to the first duration.”**

To the extent this claim is not indefinite due to reciting “shall,” Nogami discloses or suggests the feature of claim 3. Ex-1002, ¶¶94-96. Claim 3 does not require any specific action to be taken when the “larger than or equal to the first duration” condition is met—the claim merely says that the condition of claim 3 has to be met. Just as it would have been obvious in view of Nogami to implement *not allowing to transmit* the signal in a certain condition involving an interval between any two bit positions with the value of one as in limitation 1(e), it was also obvious

that there would exist another interval between two bit positions (not the same ones as relied upon for the analysis above regarding limitation 1(e)) where that certain condition does *not* hold true (note that “larger than or equal to the first duration” in claim 3 is the logical complement, or opposite, of “smaller than the first duration” in claim 1). In other words, limitation 1(e) requires performing some action (not allowing to transmit the signal) when the certain condition is met, and claim 3 (which recites the logical complement of the condition recited in limitation 1(e)) merely requires that there be *some* situation in which that condition is *not* met. A POSITA would have recognized that Nogami discloses or suggests, for example, the first duration is 3 as disclosed in Nogami and the “interval between two bit positions” is the interval between bit positions 1 and 14. Ex-1002, ¶¶94-95.

To the extent “the interval between two bit positions in the set in the bit map” as recited in claim 3 is understood to refer to the interval between every two bit positions with a value of one in the bitmap that the network node transmits in the first step of claim 1, Nogami likewise discloses or suggests the feature. Ex-1002, ¶96. That is, just as it would have been obvious in view of Nogami to implement *not allowing to transmit* the signal in a certain condition involving an interval between any two bit positions smaller than the first duration, it was also obvious for the network node *to transmit* a bitmap, in the complementary event when an interval between every two bit positions is greater than or equal to the first duration. *Id.*

4. Claim 6

- a. “The method of claim 1, wherein the network node transmits a Physical Downlink Control Channel (PDCCH) candidate on monitoring occasion(s) of the CORESET.”

Nogami discloses or suggests this limitation. Ex-1002, ¶¶97-98. As discussed above for limitation 1(d), Nogami discloses with respect to Figure 17 that:

[t]he higher layer parameter *CORESET-monitor-DCI-symbolPattern* per search space set may consist of 14 bits, the 1st bit to 14th bit which correspond to OFDM symbol #0 to #13, respectively. *Each of the bits indicates whether or not PDCCH is monitored on the corresponding OFDM symbol* (e.g. [“0”] indicates no PDCCH monitoring and “1” indicates PDCCH monitoring, or vice versa). In this example, the higher layer parameters *CORESET-monitor-DCI-symbolPattern for search space set #2 indicates OFDM symbols #0 and #7 for PDCCH monitoring*, [while] the higher layer parameters *CORESET-monitor-DCI-symbolPattern for search space set #3 indicates OFDM symbols #0, #2, #4, #6, #8, #10, #12 for PDCCH monitoring*.

Ex-1004, 29:54-67; Ex-1012, ¶[00113].

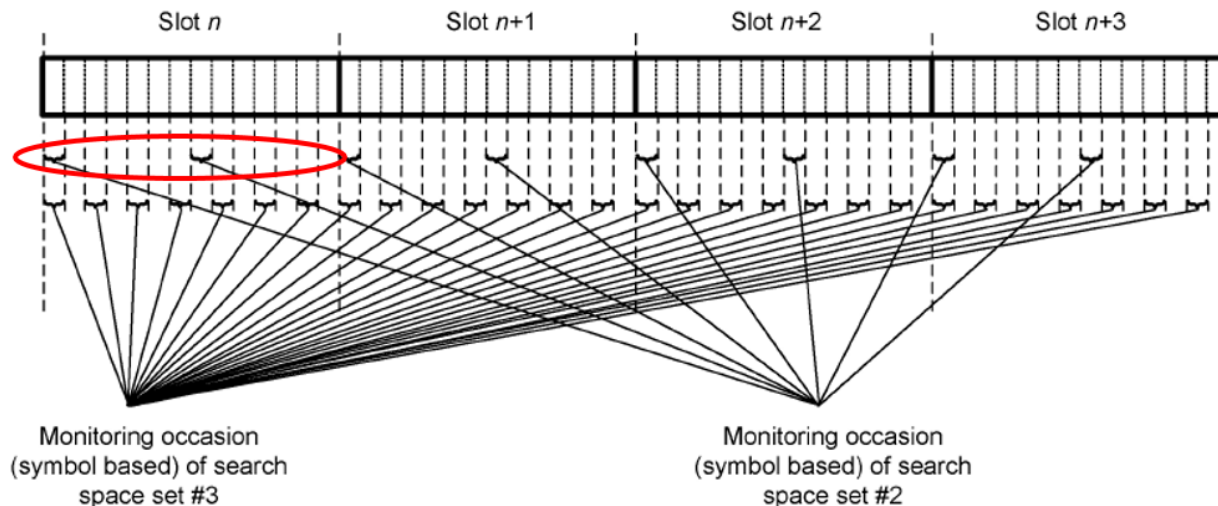


FIG. 17

Ex-1004, FIG. 17 (annotated); Ex-1012, Fig. 17, Ex-1002, ¶97.

Additionally, as discussed above for the preamble of claim 1, the base station (“network node”) transmits the first RRC configuration (indicating the CORESET duration) and second RRC configuration (including bitmap information). *Supra* Section VII.B.1.a-b; Ex-1004, 2:49-63; Ex-1012, ¶[00137]. Thus, a POSITA would have understood that Nogami discloses that the base station (“network node”) transmits a PDCCH candidate on monitoring occasions of the CORESET (e.g., monitoring occasions shown in Figure 17). Ex-1002, ¶98. Such understanding of a POSITA is consistent with the known use of CORESET. Ex-1008, ¶¶[0114], [0351], Abstract; Ex-1020, ¶[0109], Abstract; Ex-1002, ¶98.

5. **Claim 7**

- a. **“The method of claim 1, wherein the signal indicates the configuration of the CORESET.”**

Nogami discloses or suggests this limitation. Ex-1002, ¶99. As discussed above for limitation 1(b), Nogami’s “base station includes a higher layer processor configured to send a first [RRC] *configuration* including first information for indicating [*CORESET*] duration, and to send second RRC *configuration* including second information for indicating [PDCCH] monitoring symbols.” *Supra* Section VII.B.1.b; Ex-1004, 2:49-63, Abstract; Ex-1012, ¶[00137]. Thus, a POSITA would have understood that Nogami discloses that the signal, which indicates a CORESET duration and a bitmap specifying monitoring occasion start symbols, indicates the configuration of the CORESET. Ex-1002, ¶99. Such understanding of a POSITA is consistent with the known use of CORESET. Ex-1008, Abstract (“The UE includes a higher layer processor configured to acquire a dedicated [RRC] message ... including information for *indicating a configuration of a [CORESET]*.”); Ex-1020, 139 (Abstract); Ex-1002, ¶99.

6. **Claim 8**

- a. **“The method of claim 1, wherein the signal is PDCCH-config information element.”**

Nogami discloses or suggests this limitation. Ex-1002, ¶100. The feature “the signal is PDCCH-config information element” merely refers to a particular variable

name, and the specification of the '359 patent even admits that the choice of that variable name is found in a then-existing telecommunications standard. Ex-1001, 12:16-22, cols. 12-15 (showing the data structure named “PDCCH-Config”); Ex-1002, ¶100. It would have been obvious to give the name of “PDCCH-Config” to a data structure indicating a CORESET duration and a bitmap for specifying PDCCH monitoring occasions, because such a data structure involves configuring PDCCH. Ex-1004, 2:49-63; Ex-1012, ¶[00137]; Ex-1002, ¶100.

7. Claim 9

a. “The method of claim 1, wherein the interval is the difference between two bit positions.”

Nogami discloses or suggests this limitation. Ex-1002, ¶¶101-102. As discussed above for limitation 1(e), a POSITA would have recognized that the overlap in adjacent monitoring occasions explicitly described by Nogami (Ex-1004, 30:60-64; Ex-1012, ¶[00117]) involves an interval between adjacent ‘1’ bits that is insufficiently large, and that the interval between, e.g., the first and second instances of ‘1’ in 11000000000000 at the 1st and 2nd bits, respectively, can be considered to be 1 because 2-1=1. And indeed, if Nogami’s CORESET duration is 2, there will be overlap between the two PDCCH monitoring occasions, meeting the limitation 1(e) not to transmit such signal. *Supra* Section VII.B.1.e. Nogami describes such overlapping: “... if the CORESET duration is more than 1 OFDM symbol and at least if any of two adjacent bits of the CORESET-monitor-DCI-symbolPattern are

set to ‘1’, PDCCH monitoring occasions starting with OFDM symbols indicated by those two bits partially overlap.” Ex-1004, 30:60-64; Ex-1002, ¶101. And Nogami states a possible solution to such an overlap “is that the UE 102 is not expected to be configured with the CORESET-monitor-DCI-symbolPattern which causes overlapping between adjacent PDCCH monitoring occasions for a same search space set.” Ex-1004, 30:65-31:2.

To the extent Nogami does not explicitly state that the interval is the *difference between* two bit positions, this would have been obvious in view of the knowledge of a POSITA because calculating a difference (subtraction) between two bit positions of the starting symbols of the two monitoring occasions would have been readily appreciated as an elementary, predictable way to keep track of the spacing between ‘1’ bits that specify monitoring occasions. Ex-1002, ¶102. A POSITA would have found it obvious to try this approach because it merely involved choosing from predictable options—e.g., calculate the difference between the bit positions, as opposed to checking how many bits are between them (which would be one fewer). *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 420-21 (2007); Ex-1002, ¶102.

8. **Claim 11**

- a. **“The method of claim 1, wherein the CORESET is monitored on a number of consecutive OFDM symbol[s] provided by the first duration from the starting OFDM symbol.”**

Nogami discloses or suggests this limitation. Ex-1002, ¶103. As discussed above for limitation 1(b), Nogami discloses that “[e]ach bit of the bitmap information may correspond to a respective *OFDM symbol* in a slot” and “[t]he bit of which value is set to 1 may indicate a *start of* a PDCCH monitoring occasion.” Ex-1004, 2:60-63; Ex-1012, ¶¶[0078], [0092]-[0094], [00137]. Nogami further discloses that “the configuration includes ... the *number of consecutive symbols* provided by higher layer parameter *CORESET-time-duration*” (Ex-1004, 28:41-44) and “each bit of the *CORESET*-monitor-DCI-symbolPattern set to ‘1’ may indicate the *starting symbol of one or more consecutive OFDM symbol(s)* on which PDCCH candidate(s) are mapped” (*id.*, 30:55-59). Ex-1002, ¶103; Ex-1012, ¶¶[00109], [00116]. Thus, a POSITA would have understood that in Nogami’s process and system, the CORESET is monitored on a number of consecutive OFDM symbol provided by the first duration from the starting OFDM symbol. Ex-1002, ¶103.

9. **Claim 22**

a. **“A network node, comprising;”**

To the extent that the preamble is limiting, Nogami discloses a base station (“network node”), as explained above for claim 1. *Supra* Section VII.B.1.a; Ex-1002, ¶104; *see also infra* Sections VII.B.9.b-e (remaining elements of this claim).

b. **“a control circuit;”**

Nogami discloses or suggests this limitation. Ex-1002, ¶105. Nogami discloses that “one or more of the elements or parts thereof included in the gNB(s) 160 and UE(s) 102 may be implemented in hardware” and “may be implemented as a chip, *circuitry* or hardware components, etc.” Ex-1004, 9:59-10:3; *see also id.*, 36:18-20, 41:24-30, 41:46-51; Ex-1012, ¶¶[0045], [00137], [00159], [00162]; Ex-1002, ¶105. Nogami further discloses that “gNB 160 may also include PDCCH transmitting *circuitry* which is configured to transmit a PDCCH based on the control resource set configuration.” Ex-1004, 27:40-50; Ex-1012, ¶[00103]. Thus, a POSITA would have understood that Nogami discloses a control circuit that controls functionality of the base station (also called gNB). Ex-1002, ¶105.

c. **“a processor installed in the control circuit; and”**

Nogami discloses or suggests this limitation for at least the reasons discussed above regarding limitation 22(b). *Supra* Section VII.B.9.b; Ex-1002, ¶106. For example, Nogami discloses that “gNB 160 may comprise a higher layer *processor*

configured to send a dedicated radio resource control (RRC) configuration” and that “[a] program running on the gNB 160 or the UE 102 according to the described systems and methods is a program (a program for causing a computer to operate) that controls a *CPU*,” which a POSITA would have understood to be a central processor unit installed in the control circuit. Ex-1004, 36:18-22, 41:46-51; Ex-1002, ¶106; *see also* Ex-1004, FIG. 3 (below); Ex-1012, ¶¶[00103], [00162]. A POSITA would have understood that the processor is installed in the control circuit, e.g., because “one or more of the elements or parts thereof included in the gNB(s) 160 and UE(s) 102 may be implemented in hardware” and “may be implemented as a chip, *circuitry* or hardware components, etc.” and because Nogami describes its methods as being implemented/realized in circuitry. Ex-1004, 9:59-10:3, 41:24-30; Ex-1012, ¶¶[0045], [00159], Ex-1002, ¶106.

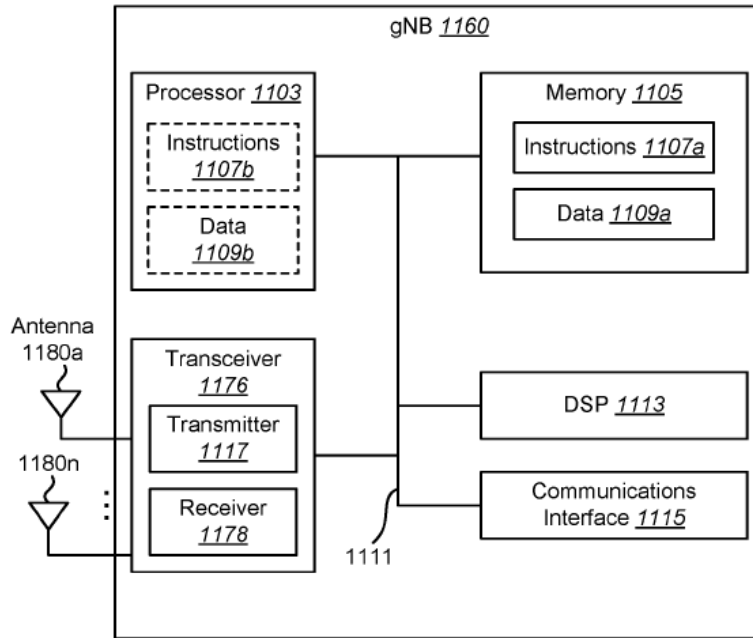


FIG. 3

Ex-1004, FIG. 3 (showing processor 1103); Ex-1012, FIG. 3.

d. “a memory installed in the control circuit and coupled to the processor;”

Nogami discloses or suggests this limitation for at least the reasons discussed above regarding limitations 22(b)-(c). *Supra* Sections VII.B.9.b-c; Ex-1002, ¶107. For example, Nogami discloses that “gNB 1160 includes a processor 1103 that controls operation of the gNB 1160,” and “[m]emory 1105 ... provides instructions 1107a and data 1109a to the processor 1103.” Ex-1004, 10:45-52; Ex-1012, ¶[0049]. A POSITA would have understood that the memory is installed in the control circuit, e.g., because “one or more of the elements or parts thereof included in the gNB(s) 160 and UE(s) 102 may be implemented in hardware” and “may be implemented as

a chip, circuitry or hardware components, etc.” and because Nogami describes its methods as being implemented/realized in circuitry. Ex-1004, 9:59-10:3, 41:24-30; Ex-1012, ¶¶[0045], [00159]; Ex-1002, ¶107.

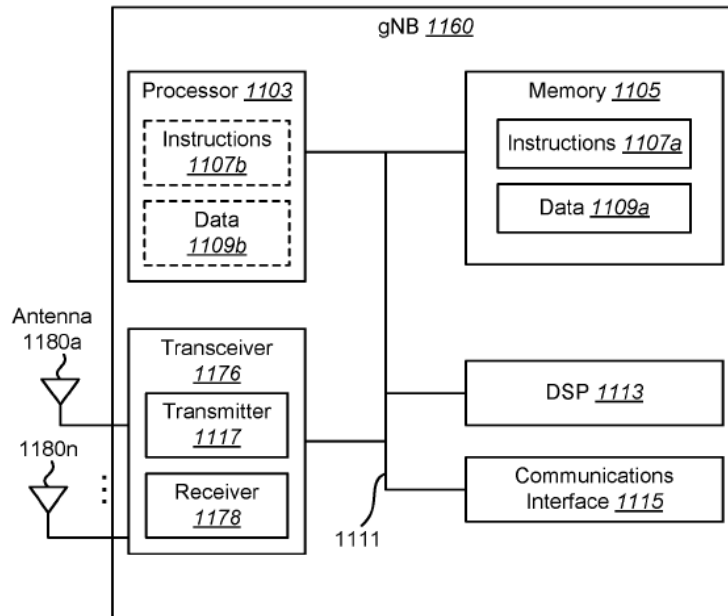


FIG. 3

Ex-1004, FIG. 3 (showing memory 1105 coupled to processor 1103); Ex-1012, FIG. 3.

e. “wherein the processor is configured to execute a program code stored in the memory to:”

Nogami discloses or suggests this limitation for at least the reasons discussed above for limitations 22.b-d. *Supra* Sections VII.B.9.b-d; Ex-1002, ¶108. For example, Nogami discloses that “[m]emory 1105 ... provides instructions 1107a and data 1109a to the processor 1103” (Ex-1004, 10:45-52) and “[a] program running on the gNB 160 or the UE 102 according to the described systems and methods is a

program (a program for causing a computer to operate) that controls a CPU and the like in such a manner as to realize the function according to the described systems and methods” (*id.*, 41:46-51). Ex-1012, ¶¶[0049], [001162]. A POSITA would have understood that the program is program code implemented with instructions. Ex-1002, ¶108.

i. “transmit a signal indicating at least a first duration and a bit map,”

Nogami discloses or suggests this limitation for the reasons discussed above regarding the substantially identical limitation of claim 1. *Supra* Section VII.B.1.b; Ex-1002, ¶109.

ii. “wherein the first duration is time duration of a control resource set (CORESET), and”

Nogami discloses or suggests this limitation for the reasons discussed above regarding the substantially identical limitation of claim 1. *Supra* Section VII.B.1.c; Ex-1002, ¶110.

- iii. **“wherein the bit map includes a set of bit positions, where each bit position has a value of one or zero and each bit position with the value of one indicates a starting Orthogonal Frequency Division Multiplexing (OFDM) symbol of a monitoring occasion of the CORESET within a slot; and”**

Nogami discloses or suggests this limitation for the reasons discussed above regarding the substantially identical limitation of claim 1. *Supra* Section VII.B.1.d; Ex-1002, ¶111.

- iv. **“not allowing to transmit the signal such that an interval between any two bit positions with the value of one in the set of bit positions in the bit map is smaller than the first duration.”**

Nogami discloses or suggests this limitation for the reasons discussed above regarding the substantially identical limitation of claim 1. *Supra* Section VII.B.1.e; Ex-1002, ¶112.

10. **Claim 23**

- a. **“The network mode of claim 22, wherein the CORESET is monitored on a number of consecutive OFDM symbol[s] provided by the first duration from the starting OFDM symbol.”**

Nogami discloses or suggests this limitation for the reasons discussed above regarding the identical limitation of claim 11. *Supra* Section VII.B.8; Ex-1002, ¶113.

C. Ground 2: Claims 4, 12-14, 16-19, and 21 Are Obvious Over Nogami in View of Chatterjee and NTT

1. Claim 4

- a. “The method of claim 1, wherein the network node is not allowed to transmit the signal such that [an] interval between any bit position in the set in the bit map and the least significant bit position in the bit map is smaller than the first duration minus one.”**

Nogami in view of Chatterjee discloses or suggests this limitation. Ex-1002, ¶¶114-121. As discussed above for limitation 1(e), a POSITA would have found it obvious to implement the base station not to transmit the signal in a situation of overlapping monitoring occasions. *Supra* Section VII.B.1.e; Ex-1002, ¶114. A POSITA would have recognized that the monitoring occasion is to check if there is PDCCH actually conveyed in the ODFM symbols allocated to the CORESET for the purpose of conveying PDCCH candidates. Ex-1002, ¶114. A POSITA would have also recognized that a concern arises if the duration and the start symbol of a monitoring occasion are such that there will not be enough symbols left for the CORESET duration before the end of the slot is reached. *Id.* For example, a POSITA would have known that for a 14-symbol slot (and a corresponding 14-bit CORESET bitmap), starting a 3-symbol-duration monitoring occasion at symbol 13 could not accommodate the CORESET duration because there are only two symbols remaining (i.e., symbols 13 and 14, if the first symbol is numbered as symbol 1) before the end of the slot. *Id.*

Chatterjee explicitly discloses this concern. *Id.*, ¶115. Chatterjee, like Nogami, is directed to resource allocation for mobile communications systems, including 5G communication systems involving monitoring of PDCCH for CORESET resource configuration, and thus is analogous art to the '359 patent. Ex-1005, Title, 1:15-18, 1:20-36, 2:9-14, 2:36-47, 6:46-56; Ex-1001, Title, Abstract, 1:16-19; Ex-1013, Title, 2-4, 7; Ex-1002, ¶115. For example, Chatterjee is in the same field as the '359 patent (e.g., resource configuration for mobile wireless communications) and is reasonably pertinent to the problem addressed by the '359 patent (e.g., configuring resources in a mobile 5G system in the CORESET context). Ex-1002, ¶115.

Chatterjee discloses that “the allocated symbols do not cross the slot-boundary.” Ex-1005, 17:47-58; *see also* Ex-1013, 6; Ex-1002, ¶116.⁶ Similarly, Chatterjee explicitly discloses making any symbol the start symbol for a physical downlink control shared channel (PDSCH) subject to the constraint that “the allocation does not cross the slot boundary.” Ex-1005, col. 19 (Table 15); *see also Id.*, col. 65 (Table 29); Ex-1002, ¶116. Chatterjee further explains that in a situation where a slot boundary would be crossed by a certain group of symbols, “such a

⁶ Citations herein to Chatterjee-provisional (Ex-1013) are with respect to the internal pagination (at the bottom of the pages) of the originally-filed specification.

transmission may need to be postponed.” Ex-1005, 22:29-46; Ex-1013, 8, 50; Ex-1002, ¶116.

A POSITA would have recognized in view of NTT that while the above disclosures of Chatterjee are in the context of physical downlink shared channel (PDSCH), the underlying concern regarding not transmitting symbols that would cross a slot boundary are applicable to CORESET monitoring for PDCCH candidates, too. Ex-1002, ¶117. NTT is a 3GPP working group meeting document that discloses various issues relating to 5G/3GPP wireless communication, including CORESET configuration (Ex-1019, 1-2), downlink control information (DCI) formats in the context of CORESET (*id.*, 3-4), and PDCCH blind decoding by the UE (*id.*, 6-7). NTT, like Nogami, is directed to resource allocation for mobile communications systems, including 5G communication systems involving monitoring of PDCCH for CORESET resource allocation, and thus is analogous art to the ’359 patent. For example, NTT is in the same field as the ’359 patent (e.g., resource configuration for mobile wireless communications) and is reasonably pertinent to the problem addressed by the ’359 patent (e.g., configuring resources in a mobile 5G system in the CORESET context). Given the repeated references in Nogami to 3GPP, a POSITA implementing Nogami’s system/process would have been motivated to consult the teachings of NTT, which is a 3GPP working group meeting document. Ex-1002, ¶117.

Regarding time-domain allocation of a CORESET, NTT discloses that “[f]or non-slot-based scheduling, it is useful to enable CORESET starting at any OFDM symbol, where the *need of some restrictions on particular cases (e.g., whether a CORESET can span a slot boundary)* should be FFS [for future study].” Ex-1019, 2. A POSITA would have known that implementing a CORESET involves monitoring a PDCCH in the CORESET. *See, e.g.*, Ex-1008, Abstract; Ex-1020, 139; Ex-1002, ¶118.

Therefore, a POSITA would have recognized, based on NTT’s explicit mention of a restriction in the situation of CORESET spanning a slot boundary, that it would have been undesirable to use symbols that cross a slot boundary for CORESET monitoring of PDCCH candidates. Ex. 1002, ¶119. For example, a POSITA would have understood that for slot-based scheduling, where a search space is not present in the next slot (for example, as for Slot $n+1$ in Figure 16 of Nogami with only search space set #0 present), the symbols at the beginning of the next slot could be allocated to PDSCH for example, a situation that would lead to a collision with the across slot-boundary CORESET scheduling. As another example, a POSITA would have understood that if CORESET monitoring of PDCCH candidates would extend to the next slot (i.e., across slot-boundary), there might be overlap with search spaces that are located at the beginning of the next slot; e.g., for CORESET bitmap 10000000000001 and duration of 2. *Id.*

Thus, a POSITA would have found it obvious in view of Chatterjee and NTT to configure Nogami's base station ("network node") so that it is not allowed to transmit the signal such that an interval between any bit position in the set in the bit map having a value of '1' and the least significant bit position in the bit map is smaller than the first duration minus one. *Id.*, ¶120. A POSITA would have recognized that such a small interval corresponds to a situation where there are insufficient symbols in the present slot, and a slot boundary would (undesirably) need to be crossed to provide for the CORESET duration. *Id.* A POSITA would have been motivated to consider the teachings of Chatterjee and NTT when implementing Nogami's system/process because these references are in analogous fields and because Chatterjee and NTT provide teachings about why scheduling across a slot boundary should be avoided, including in the context of monitoring a PDCCH in a CORESET. *Id.*

For example, a POSITA would have understood that with an example of a 14-symbol slot (with a corresponding 14-bit bitmap), starting a 3-symbol-duration monitoring occasion at symbol 13 would correspond to the bitmap having a '1' at the 13th bit position, such that an interval between the 13th bit position and the least significant bit position (here, 14th bit position) is $14-13=1$, which is smaller than the first duration minus one (i.e., is smaller than $3-1=2$). *Id.*, ¶121. As discussed above, such a situation is problematic due to insufficient symbols (only two symbols, not

three as required by the duration) in the present slot, such that a symbol in the next slot would also be needed for the CORESET. *Id.* Chatterjee and NTT would have motivated a POSITA to configure Nogami's base station not to transmit the signal in such a situation. *Id.* Given Chatterjee's explicit disclosure about postponing a transmission that would cross a slot boundary and NTT's explicit disclosure about a restriction in the situation of CORESET spanning a slot boundary, a POSITA would have found it obvious to implement the base station to not be allowed to transmit the signal in such a situation, and would have had a reasonable expectation of success regarding such an implementation. *Id.*

2. **Claim 12**

a. **“A method of a network node, the method comprising:”**

To the extent that the preamble is limiting, Nogami discloses a method of a base station (“network node”) for the same reasons discussed above regarding the preamble of claim 1. *Supra* Section VII.B.1.a; Ex-1002, ¶122; *see also* Sections VII.C.2.b-e (remaining elements of this claim).

b. **“transmitting a signal indicating at least a first duration and a bit map,”**

Nogami discloses or suggests this limitation for the same reasons discussed above regarding the identical limitation of claim 1. *Supra* Section VII.B.1.b; Ex-1002, ¶123.

- c. **“wherein the first duration is time duration of a control resource set (CORESET), and”**

Nogami discloses or suggests this limitation for the same reasons discussed above regarding the identical limitation of claim 1. *Supra* Section VII.B.1.c; Ex-1002, ¶124.

- d. **“wherein the bit map includes a set of bit positions, where each bit position has a value of one or zero and each bit position with the value of one indicates a starting Orthogonal Frequency Division Multiplexing (OFDM) symbol of a monitoring occasion of the CORESET within a slot; and”**

Nogami discloses or suggests this limitation for the same reasons discussed above regarding the identical limitation of claim 1. *Supra* Section VII.B.1.d; Ex-1002, ¶125.

- e. **“not allowing to transmit the signal such that [an] interval between any bit position with the value of one in the set of bit positions in the bit map and the least significant bit position in the bit map is smaller than the first duration minus one.”**

Nogami in view of Chatterjee and NTT discloses or suggests this limitation for the same reasons discussed above regarding the substantially identical limitation of claim 4. *Supra* Section VII.C.1; Ex-1002, ¶126.

3. Claim 13

- a. **“The method of claim 12, wherein the network node is not allowed to transmit the signal indicating that the first duration is 2 and the bit map is 00000000000001.”**

Nogami in view of Chatterjee and NTT discloses or suggests this limitation. Ex-1002, ¶127. As discussed above for claim 4, it would have been obvious in view of Nogami, Chatterjee, and NTT to implement the base station (“network node”) *to be not allowed to transmit* a signal such that an interval between any bit position with the value of one in the set in the bitmap and the least significant bit position in the bitmap is smaller than the first duration minus one. *Supra* Section VII.C.1. The features recited in claim 13—first duration is 2, and bitmap is 00000000000001—are just one instance of the general condition recited in claim 4. For the bitmap 00000000000001, the interval between the 14th bit position (which has the value of ‘1’) and the least significant bit position (which is the same, i.e., 14th bit position) is 0 (because $14-14=0$), and that is smaller than the first duration minus one (i.e., smaller than $2-1=1$). Ex-1002, ¶127. So for the same reasons that a POSITA would have found claim 4 obvious in view of Nogami, Chatterjee, and NTT, a POSITA would have also found claim 13 obvious in view of those references. *Id.*

4. Claim 14

- a. **“The method of claim 12, wherein the interval between a bit position in the set in the bit map and the**

least significant bit position in the bit map shall be larger than or equal to the first duration minus one.”

Nogami in view of Chatterjee and NTT discloses or suggests this limitation. Ex-1002, ¶¶128-130. Claim 14 does not require any specific action to be taken when the “larger than or equal to the first duration minus one” condition is met—the claim merely says that the condition of claim 14 has to be met. Just as it would have been obvious in view of Nogami, Chatterjee, and NTT to implement *not allowing to transmit* the signal in a certain condition involving an interval as in limitation 12(e), it was also obvious in view of those references that there would exist another interval where that certain condition does *not* hold true. In other words, limitation 12(e) requires performing some action (not allowing to transmit the signal) when the certain condition is met, and claim 14 (which recites the logical complement, or opposite, of the condition recited in limitation 12(e)—“larger than or equal to the first duration minus one” instead of “smaller than the first duration minus one”) merely requires that there be *some* situation in which that condition is *not* met. A POSITA would have recognized that Nogami in view of Chatterjee and NTT discloses or suggests, for example, the first duration is 3 as disclosed in Nogami and the “interval between a bit position ... and the least significant bit position” is the interval between bit positions 1 and 14 (bit position 14 is the least significant bit position when there are 14 bits in the bitmap as in Nogami). Ex-1002, ¶¶128-129.

On the other hand, to the extent that “the interval” between a bit position “in the set in the bit map and the least significant bit position in the bitmap” as recited in claim 14 is understood to refer to the interval between every bit position with a value of one in the bitmap and the least significant bit position in the bitmap that the network node transmits in the first step of claim 12, Nogami likewise discloses or suggests the feature. That is, just as it would have been obvious in view of Nogami to implement *not allowing to transmit* the signal in a certain condition involving an interval as in claim 12, it was also obvious for the network node *to transmit* a bitmap, in the complementary event when the interval between every bit position with a value of one and the least significant bit position in the bit map is greater than or equal to the first duration minus one. *Id.*, ¶130.

5. Claim 16

- a. **“The method of claim 12, wherein the network node transmits a Physical Downlink Control Channel (PDCCH) candidate on monitoring occasion(s) of the CORESET.”**

Nogami discloses or suggests this limitation for the reasons discussed above regarding the identical limitation of claim 6. *Supra* Section VII.B.4; Ex-1002, ¶131.

6. **Claim 17**

- a. **“The method of claim 12, wherein the signal indicates the configuration of the CORESET.”**

Nogami discloses or suggests this limitation for the reasons discussed above regarding the identical limitation of claim 7. *Supra* Section VII.B.5; Ex-1002, ¶132.

7. **Claim 18**

- a. **“The method of claim 12, wherein the signal is PDCCH-config information element.”**

Nogami discloses or suggests this limitation for the reasons discussed above regarding the identical limitation of claim 8. *Supra* Section VII.B.6; Ex-1002, ¶133.

8. **Claim 19**

- a. **“The method of claim 12, wherein the interval is the difference between two bit positions.”**

Nogami in view of Chatterjee and NTT discloses or suggests this limitation for the reasons discussed above regarding claim 9. *Supra* Section VII.B.7; Ex-1002, ¶134. The “interval” of claim 19 refers to the “interval” recited in claim 12. Just as discussed above for claim 9 (whose “interval” refers to the “interval” of claim 1), it would have been obvious to implement the “interval” of claim 19 as the *difference between* two bit positions, because calculating a difference (subtraction) between two bit positions of the starting symbols of the two monitoring occasions would have been readily appreciated as an elementary, predictable way to keep track of the spacing between a ‘1’ bit and the least significant bit position. *Id.*

9. **Claim 21**

- a. **“The method of claim 12, wherein the CORESET is monitored on a number of consecutive OFDM symbol provided by the first duration from the starting OFDM symbol.”**

Nogami discloses or suggests this limitation for the reasons discussed above regarding the identical limitation of claim 11. *Supra* Section VII.B.8; Ex-1002, ¶135.

D. Ground 3: Claims 1-4, 6-9, 11-14, 16-19, and 21-23 Are Obvious in View of Nogami and 3GPP-Specification

1. **Claim 1**

As discussed above in Section VII.B.1 for Ground 1, Nogami in view of the knowledge of a POSITA discloses or suggests all the limitations of claim 1, including that a base station transmits a signal indicating a CORESET duration and a bitmap and that the signal meets the various claim limitations, including limitation 1(e). To the extent that the Board finds that Nogami in view of the knowledge of a POSITA does not disclose or suggest the feature “an interval between any two bit positions with the value of one ... is smaller than the first duration” as recited in limitation 1(e), it would nevertheless have been obvious in view of 3GPP-Specification to implement this feature. Ex-1002, ¶¶136-141.

3GPP-Specification is a technical specification for a 5G standard developed within the 3GPP—and the ’359 patent discusses mobile communication

technologies developed by 3GPP for 5G. *See, e.g.*, Ex-1001, 1:35-39, 2:14-39. 3GPP-Specification, like Nogami, is directed to resource allocation for 5G mobile communications systems involving monitoring of PDCCH for CORESET resource allocation, and thus is analogous art to the '359 patent. Ex-1006, 7, 68-69, 88; Ex-1002, ¶136. 3GPP-Specification is in the same field as the '359 patent (e.g., resource configuration for mobile wireless communications) and is reasonably pertinent to the problem addressed by the '359 patent (e.g., configuring resources in a mobile 5G system in the CORESET context). Ex-1002, ¶136.

3GPP-Specification discloses that a user equipment is provided a CORESET duration and bitmap. For example, 3GPP-Specification discloses that “[f]or each control resource set, the UE is provided the following by higher layer parameter *ControlResourceSet*: ... a number of consecutive symbols provided by higher layer parameter *duration*” (Ex-1006, 68, emphasis in original) and that “the UE is provided the following by higher layer parameter *SearchSpace*: ... a PDCCH monitoring pattern within a slot, indicating first symbol(s) of the control resource set within a slot for PDCCH monitoring, by higher layer parameter *monitoringSymbolsWithinSlot*” (*id.*, 69, emphasis in original). A POSITA would have understood that the parameters *duration* and *monitoringSymbolsWithinSlot* are the CORESET duration and bitmap described in Nogami, because they are described in the same manner in the two references. Ex-1002, ¶137. Therefore, given the

similar subject matter in the two references, a POSITA implementing Nogami's process/system would have looked to 3GPP-Specification for guidance regarding implementation strategies and details. Ex-1004, 3:33-51; Ex-1002, ¶137. Indeed, 3GPP-Specification lists on its cover "Release 15" which is the same 3GPP standard that Nogami states that its systems/methods are applicable to. Ex-1006, Cover; Ex-1004, 3:47-50; Ex-1002, ¶137.

3GPP-Specification discloses, in the context of describing its bitmap (*monitoringSymbolsWithinSlot*), that:

A UE ***does not expect*** any two PDCCH monitoring occasions, for a same search space set or for different search space sets, in a same [CORESET] to be ***separated by a non-zero number of symbols that is smaller than the [CORESET] duration***.

Ex-1006, 69.

In other words, like Nogami, 3GPP-Specification describes a condition that should be avoided. Ex-1002, ¶¶138-139. Given that Nogami's bitmap has bits that correspond to respective symbols (with a bit value of '1' indicating a start of a monitoring occasion), a POSITA would have found the foregoing disclosure of 3GPP-Specification to provide valuable guidance regarding a situation to be avoided by not allowing signal transmission in such a situation. *Id.* More specifically, since 3GPP-Specification teaches that the UE is not expected to receive particular configurations of the PDCCH monitoring occasions (i.e., ***separated by a non-zero***

number of symbols that is smaller than the CORESET duration), a POSITA would have understood that it would be inappropriate for the base station (“network node”) to transmit such configurations in the first place, at least because such transmissions (1) would not be accepted by UE and would waste the transmission bandwidth, (2) would waste UE processing time, and (3) depending on UE design, might confuse UE. Ex-1002, ¶139. Thus, the disclosure of “does not expect” in the 3GPP-Specification would have taught or suggested to a POSITA the feature of *not allowing to transmit the signal*, as required by limitation 1(e).

A POSITA would have been motivated to implement a system which does not allow to transmit the signal such that an interval between any two bit positions with the value of one in the set of bit positions in the bit map is smaller than the first duration. *Id.*, ¶¶140-141. This would have been a predictable implementation of Nogami’s process, and a POSITA would therefore have had a reasonable expectation of successfully achieving such an implementation. *Id.*

2. Claims 2, 3, 6-9, and 11

These dependent claims are obvious over Nogami in view of 3GPP-Specification for at least the reasons discussed above regarding the respective dependent claims in Ground 1, and the reasons discussed above in Ground 3 regarding base claim 1. *Supra* Sections VII.B.2-8, VII.D.1; Ex-1002, ¶¶142-145.

Additionally, regarding claim 2, it would have been obvious to implement the feature of the base station (“the network node”) not allowed to transmit the signal indicating that the first duration is 2 and the bit map is 11000000000000. Ex-1002, ¶143. As noted above in Ground 1 for claim 2, the features recited in claim 2 are just one instance of the general condition recited in limitation 1(e), and it would have been obvious in view of 3GPP-Specification to implement the limitation 1(e) feature for the reasons discussed above in Section VII.D.1. A POSITA would have recognized that the disclosure in 3GPP-Specification about spacing two PDCCH monitoring occasions sufficiently far apart (*supra* Section VII.D.1) reflects a broader concern about avoiding overlapping monitoring occasions, and that such a broader concern is also applicable to the narrower instance recited in claim 2. Ex-1002, ¶143.

Additionally, regarding claim 9, it would have been obvious to implement the feature “the interval is the difference between two bit positions” in Nogami’s process in light of 3GPP-Specification’s disclosure that “[a] UE does not expect any two PDCCH monitoring occasions ... in a same [CORESET] to be *separated by a non-zero number of symbols that is smaller than the [CORESET] duration*” (Ex-1006, 69) because 3GPP-Specification’s condition of “separated by a non-zero number of symbols” is more restrictive than the claimed feature of “the interval is the difference between two bit positions.” Ex-1002, ¶144.

A POSITA would have recognized that because each bit position in Nogami's bitmap corresponds to a symbol (where a bit value of '1' indicates a monitoring occasion as explained above in Ground 1 for claim 1), 3GPP-Specification's disclosure about avoiding separating two monitoring occasions by a nonzero number of symbols less than the duration has relevance to Nogami's bitmap. Ex-1002, ¶145. For example, if Nogami's bitmap begins with 101... and the duration is 3 (for example), 3GPP-Specification instructs a POSITA that such a bitmap is undesirable because the first two '1' bits (at the 1st and 3th bit positions) are separated by a nonzero number (1) of symbols that is smaller than the duration (3). *Id.* A POSITA would have seen that in such an instance, the difference between the '1' bit positions is $3-1=2$. *Id.* Thus, a POSITA would have understood that it is desirable to not allow transmitting the signal in the above example where the difference between the two bit positions with the value of one is smaller than the first duration. This would have been a straightforward implementation for a POSITA because it would have merely involved elementary arithmetic (namely, a simple subtraction) and thus a POSITA would have had a reasonable expectation of success regarding such an implementation. *Id.*

3. Claim 4

Nogami in view of 3GPP-Specification discloses or suggests this claim. Ex-1002, ¶¶146-148. As discussed above for claim 4 in Ground 2, a POSITA would

have known even apart from Nogami's disclosure, and certainly would have understood based on Nogami's explicit disclosure, that a situation involving overlap between adjacent PDCCH monitoring occasions in the context of CORESET should have been avoided. *Supra* Section VII.C.1. As was discussed above for claim 4 in Ground 2, a POSITA would have found it obvious in view of Nogami to implement the base station not to transmit the signal (discussed above for claim 1 in Ground 3) in such an overlap situation. *Id.* As discussed above for claim 1 in Ground 3, a POSITA would have had reason to look to the teachings of 3GPP-Specification when implementing Nogami's process/system. *Supra* Section VII.D.1. 3GPP-Specification discloses that "[a] UE ***does not expect*** to be provided a first symbol and a number of consecutive symbols for a control resource set that results to ***a PDCCH candidate mapping to symbols of different slots.***" Ex-1006, 69. Thus, a POSITA would have understood that 3GPP-Specification is describing a cross-slot-boundary situation that should have been avoided. Ex-1002, ¶146.

In light of 3GPP-Specification's foregoing disclosure about the situation that should be avoided of a PDCCH candidate mapping to symbols of different slots, a POSITA would have found it obvious to configure Nogami's base station ("network node") so that it is not allowed to transmit the signal such that an interval between any bit position in the set in the bit map having a value of '1' and the least significant bit position in the bit map is smaller than the first duration minus one. *Id.*, ¶147. A

POSITA would have recognized that such a small interval corresponds to a situation where there are insufficient symbols in the present slot, and a slot boundary would (undesirably) need to be crossed to provide all the symbols needed for the PDCCH candidates. *Id.*

For example, a POSITA would have understood that with a 14-symbol slot (and a corresponding 14-bit CORESET bitmap), starting a 3-symbol-duration monitoring occasion at symbol 13 would correspond to the bitmap having a ‘1’ at the 13th bit position, such that an interval between the 13th bit position and the least significant bit position (here, 14th bit position) is $14-13=1$, which is smaller than the first duration minus one (i.e., is smaller than $3-1=2$). *Id.*, ¶148. As discussed above, such a situation is problematic due to insufficient symbols (only two symbols, not three as required by the duration) in the present slot, such that a symbol in the next slot would also be needed for the CORESET. *Id.* 3GPP-Specification would have motivated a POSITA to configure the base station not to transmit the signal in such a situation. *Id.* More specifically, since 3GPP-Specification teaches that the UE is not expected to receive particular configurations of the PDCCH monitoring occasions (i.e., a PDCCH candidate mapping to symbols of different slots, Ex-1006, 69), a POSITA would have understood that it would be inappropriate for the base station (“network node”) to transmit such configurations in the first place, at least because such transmissions (1) would not be accepted by UE and would waste the

transmission bandwidth, (2) would waste UE processing time, and (3) depending on UE design, might confuse the UE. Thus, disclosure of “does not expect” in 3GPP-Specification would have taught or suggested to a POSITA the feature of not allowing to transmit the signal, as required by claim 4. Ex-1002, ¶148.

4. Claim 12

As discussed above for Ground 2, Nogami discloses the preamble of claim 12 and limitations 12(b)-(e) (*supra* Sections VII.C.2.a-d for claim language). It would have been obvious in view of 3GPP-Specification to configure Nogami’s process to implement the feature of limitation 12(e) (*supra* Section VII.C.2.e for claim language) for the reasons discussed above regarding claim 4 (substantially identical to limitation 12(e)) in Ground 3. *Supra* Section VII.D.3; Ex-1002, ¶149.

5. Claims 13-14, 16-19, and 21

These dependent claims are obvious over Nogami in view of 3GPP-Specification for at least the reasons discussed regarding the respective dependent claims in Ground 2, and the reasons discussed above in Ground 3 regarding claim 12. *Supra* Sections VII.C.3-9, VII.D.4; Ex-1002, ¶150.

6. Claim 22

As discussed above in Section VII.B.1 for Ground 1, Nogami in view of the knowledge of a POSITA discloses or suggests all the limitations of claim 22, including limitation 22(e)(iv) (*supra* Section VII.B.9.e.iv for claim language). To

the extent the Board finds that Nogami in view of the knowledge of a POSITA does not disclose or suggest the feature “an interval between any two bit positions with the value of one ... is smaller than the first duration” as recited in limitation 22(e)(iv) (*supra* Section VII.B.9.e.iv), it would nevertheless have been obvious in view of 3GPP-Specification to implement this feature for the reasons discussed above regarding claim 1 in Ground 3. *Supra* Section VII.D.1; Ex-1002, ¶151.

7. Claim 23

This dependent claim is obvious over Nogami in view of 3GPP-Specification for at least the reasons discussed regarding claim 23 in Ground 1 and claim 22 in Ground 3. *Supra* Sections VII.B.10, VII.D.6; Ex-1002, ¶152.

VIII. THE BOARD SHOULD REACH THE MERITS OF THIS PETITION

A. Institution is Proper Under § 325(a)

None of the *Becton, Dickinson* factors weigh in favor of discretionary denial under § 325(d). *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 (P.T.A.B. Dec. 15, 2017) (precedential). Nogami, Chatterjee, 3GPP-Specification, and NTT are new references that were not disclosed, cited, or considered during prosecution. Ex-1001, Cover (code (56)). Although an earlier version (v15.0.0; submitted herein as Ex-1018) of the 3GPP 38.213 standard specification was listed in an Information Disclosure Statement during prosecution (Ex-1010, 258; Ex-1001, 2 (References Cited section), that version was not the basis

for any claim rejections and did not contain the disclosures of 3GPP-Specification (i.e., v15.2.0 of the standard specification) relied upon in this Petition. This Petition thus does not present a situation in which “the same or substantially the same prior art or arguments previously were presented to the Office.” 35 U.S.C. § 325(d). The Board should, therefore, grant this Petition.

B. Institution is Proper Under § 314(a)

The factors in *General Plastic Industrial Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 (P.T.A.B. Sept. 6, 2017) favor institution. This is the first and only petition challenging any claims of the ’359 patent.

The factors set forth in *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 6 (P.T.A.B. Mar. 20, 2020) (“*Fintiv*”) (precedential) also favor institution.

The **first factor** (stay) is neutral, because Petitioners have not yet moved for a stay. *Hulu, LLC v. SITO Mobile R&D IP, LLC*, IPR2021-00298, Paper 11 at 10-11 (P.T.A.B. May 19, 2021).

The **second factor** (proximity) is neutral. As the Director’s Interim Guidance explains, “[t]he PTAB will weigh this factor against exercising discretion to deny institution under *Fintiv* if the median time-to trial is around the same time or after the projected statutory deadline for the PTAB’s final written decision.” Ex-1015, 9. The Interim Guidance further explains that “[w]here the parties rely on time-to-trial

statistics, the PTAB will also consider additional supporting factors such as the number of cases before the judge in the parallel litigation” *Id.*

Jury selection is scheduled to begin on July 21, 2025. Ex-1016, 1. With this Petition filed at the start of June 2024, a final written decision may be expected by around November 2025, not long after the trial date (and likely before any appealable post-trial decision). The Board has granted institution in cases where the final written decision issued a few months after the scheduled trial date when other factors favor institution. *Hulu*, IPR2021-00298, Paper 11 at 11-18; *see also NetNut Ltd. v. Bright Data Ltd.*, IPR2021-01492, Paper 12 at 9-16 (P.T.A.B. Mar. 21, 2022) (instituting review with trial date six months before final written decision). Those same factors are present in this case. In the litigation, moreover, there are multiple defendants, and there will be separate trials. The cases are only consolidated for pretrial. Ex-1017. It is reasonable to expect that all trials will not be complete or through post-trial motion practice before the final written decision. In these circumstances, the Board treats this factor as neutral. *CrowdStrike, Inc. v. Open Text Inc.*, IPR2023-00556, Paper 9 at 8 (P.T.A.B. Sept. 12, 2023).

The **third factor** (investment) weighs against denial. The district court litigation is in its early stages. Fact discovery is in its infancy, and the parties have not engaged in expert discovery. Ex-1016, 3. The parties have not identified terms for claim construction. *Id.*, 5. Nor have there been any substantive orders in the case.

The district court's investment is, therefore, minimal. *PEAG LLC v. Varta Microbattery GmbH*, IPR2020-01214, Paper 8 at 17 (P.T.A.B. Jan. 6, 2021).

Petitioners diligently filed this Petition after they received Patent Owner's infringement contentions that confirmed Petitioners' technology is at the center of the district court litigation. The Board has recognized that "it is often reasonable for a petitioner to wait to file its petition until it learns which claims are being asserted against it in the parallel proceeding." *Fintiv*, IPR2020-00019, Paper 11 at 11. The Board has further found a petitioner acted diligently when filing its petition approximately four months after receiving the infringement contentions, which is the approximate timeframe here. *Corning Optical Communications LLC v. Dali Wireless, Inc.*, IPR2021-00762, Paper 8 at 9-10 (P.T.A.B. Oct. 31, 2021); *see also Hulu*, IPR2021-00298, Paper 11 at 13-14; *Ericsson Inc. v. Koninklijke KPN N.V.*, IPR2022-00079, Paper 9, 10-11 (P.T.A.B. May 25, 2022) (finding petitioner "very diligent" in filing two months after receiving infringement contentions); *Ericsson Inc. v. Koninklijke KPN N.V.*, IPR2022-00069, Paper 9, 11-12 (P.T.A.B. May 25, 2022) (same).

Petitioners' diligence in filing and the district court's minimal investment tip this factor in favor of institution. *PEAG*, IPR2020-01214, Paper 8 at 17-18.

The **fourth factor** (overlap) also weighs against denial. Petitioners hereby stipulate that, if trial is instituted, Petitioners will not pursue this IPR's Grounds in

the district court litigation. This stipulation eliminates any risk of overlapping effort and results. The Board has confirmed that such a stipulation “mitigates any concerns of duplicative efforts between the district court and the Board, as well as concerns of potentially conflicting decisions.” *VMWare, Inc. v. Intellectual Ventures I LLC*, IPR2020-00470, Paper 13 at 20 (P.T.A.B. Aug. 18, 2020) (“Thus, we find that this factor weighs in favor of not exercising discretion to deny institution under 35 U.S.C. § 314(a).”). “Instituting trial here serves overall system efficiency and integrity goals by not duplicating efforts and by resolving materially different patentability issues.” *Apple, Inc. v. SEVEN Networks, LLC*, IPR2020-00156, Paper 10 at 19 (P.T.A.B. June 15, 2020); *see also Sand Revolution II, LLC v. Continental Intermodal Group-Trucking LLC*, IPR2019-01393, Paper 24 at 12 (P.T.A.B. June 16, 2020). This factor, therefore, weighs against discretionary denial. *Corning Optical*, IPR2021-00762, Paper 8, 12.

The **fifth factor** (parties) favors institution. Petitioners are either parties to the district court litigations or have sought to intervene. And if Petitioners Ericsson and Nokia’s motions to intervene are granted, a “holistic view” of the factors likewise favors institution. *Verizon Business Network Services, Inc. v. Huawei Techs. Co.*, IPR2020-01141, Paper 12 at 18 (P.T.A.B Jan. 14, 2021); *Samsung Elecs. Co Ltd., v Dynamics Inc.*, IPR2020-00505, Paper 11 at 15 (P.T.A.B. Aug. 12, 2020).

Even if the Board determines that the aforementioned factors favor denial, the Board should not discretionarily deny institution, because this Petition presents compelling merits (the **sixth factor**). *CommScope Techs. LLC v. Dali Wireless, Inc.*, IPR2022-01242, Paper 23 at 4-5 (P.T.A.B. Feb. 27, 2023) (precedential). As discussed *supra*, the Examiner found most of the features in the prior art, but was likely not aware of the prior art identified in this Petition, which discloses or suggests **precisely** what the Examiner found lacking in the prior art. The Examiner would not have allowed the application over the prior art relied upon herein. Moreover, the Examiner found one limitation missing from the prior art identified during prosecution, but that limitation is **not** recited in one of the independent claims (claim 12, numbered as 13 at the time of the Notice of Allowance).

This Petition thus presents compelling merits that plainly lead to the conclusion that at least one claim is unpatentable, and the Board should grant institution. *CommScope Techs. LLC v. Dali Wireless, Inc.*, IPR2022-01242, Paper 24 at 75 (P.T.A.B. Mar. 17, 2023).

Due to Petitioners' diligence, it would be premature at the time of this Petition to argue regarding the timing of respective milestones in the proceeding versus the litigation. Thus, if Patent Owner raises § 314(a) arguments in a Preliminary Response, Petitioners respectfully request the opportunity to reply before institution, to address, e.g., the expected schedules of the co-pending cases.

IX. MANDATORY NOTICES

A. Real Parties-in-Interest

The real parties in interest are AT&T Enterprises, LLC,⁷ AT&T Mobility LLC, AT&T Mobility II LLC, AT&T Services Inc., Cellco Partnership d/b/a Verizon Wireless, Verizon Corporate Resources Group LLC, T-Mobile USA, Inc., Ericsson Inc., Telefonaktiebolaget LM Ericsson, and Nokia of America Corporation.⁸

⁷ AT&T Corp. is a named defendant in the below identified related cases. AT&T Corp. has undergone a corporate transaction and is now merged and converted into AT&T Enterprises, LLC. Out of an abundance of caution, Petitioners are identifying AT&T Enterprises, LLC as a real party in interest in this IPR.

⁸ Out of an abundance of caution, Petitioners identify all current defendants in the below identified cases as potential real parties in interest only for the purpose of this proceeding and only to the extent that Patent Owner contends that these separate legal entities should be named real parties in interest in this IPR. Petitioners do so to avoid the potential expenditure of resources to resolve such a challenge. Petitioners also acknowledge that each petitioner has a number of affiliates. No unnamed entity is funding, controlling, or otherwise has an opportunity to control or direct this

B. Related Matters

The following are a list of related matters: *ASUS Technology Licensing Inc. et al. v. AT&T Inc. et al.*, Case No. 2-23-cv-00486-JRG-RSP (E.D. Tex. 2023) (Lead Case); *ASUS Technology Licensing Inc. et al. v. T-Mobile USA, Inc.*, Case No. 2-23-cv-00487-JRG-RSP (E.D. Tex. 2023); *ASUS Technology Licensing Inc. et al. v. Verizon Communications Inc.*, Case No. 2-23-cv-00488-JRG-RSP (E.D. Tex. 2023); *Innovative Sonic Limited et al. v. AT&T Inc., et al.*, Case No. 2-23-cv-00489-JRG-RSP (E.D. Tex. 2023); *Innovative Sonic Limited et al. v. T-Mobile USA, Inc.*, Case No. 2-23-cv-00490-JRG-RSP (E.D. Tex. 2023); *Innovative Sonic Limited et al. v. Verizon Communications, Inc. et al.*, Case No. 2-23-cv-00491-JRG-RSP (E.D. Tex. 2023).

C. Lead and Back-Up Counsel

Petitioners identify lead and backup counsel below. A Power of Attorney for each Petitioner entity is filed concurrently herewith under 37 C.F.R. § 42.10(b). Patent Owner consents to electronic service by email at Celerity_IPRs@mckoolsmith.com.

Petition or Petitioners' participation in any resulting IPR. Petitioners are also not aware of any affiliate that would be barred from filing this Petition under 35 U.S.C. § 315(e).

D. Service Information Under 37 C.F.R. § 42.8(b)(4)

A copy of this entire Petition, including all Exhibits and a Power of Attorney, is being served via email and FEDERAL EXPRESS, costs prepaid, to the address of the attorney or agent of record at the USPTO:

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Minneapolis, MN 55305
UNITED STATES

Petitioners are also serving Patent Owner's litigation counsel of record, as reflected below on the Certificate of Service.

Petitioners consent to electronic service at the addresses provided above for lead and back-up counsel and at the following email address: Celerity_IPRs@mckoolsmith.com. A Power of Attorney is filed concurrently herewith under 37 C.F.R. § 42.10(b).

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X. FEES

The Office is authorized to charge any fees due during this proceeding to Deposit Account No. DA-505723.

XI. CONCLUSION

For the grounds specified above, the Board should institute IPR of the Challenged Claims.

Respectfully submitted,

/ Scott W. Hejny /
Reg. No. 45,882
Scott W. Hejny

Counsel for Petitioners

Dated: June 3, 2024

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. §42.24(a), Petitioners hereby certify that the foregoing **PETITION FOR INTER PARTES REVIEW OF U.S. PATENT 10,951,359** contains, as measured by the word-processing system used to prepare this paper, 13,961 words. Pursuant to 37 C.F.R. §42.24(a), this word count is in compliance and excludes the table of contents, table of authorities, mandatory notices under §42.8, certificate of service, certificate of word count, appendix of exhibits, and any claim listing. This word count was prepared using Microsoft Word.

Respectfully submitted,

/ Scott W. Hejny /
Reg. No. 45,882
Scott W. Hejny

Counsel for Petitioners

Dated: June 3, 2024

CERTIFICATE OF SERVICE

The undersigned hereby certifies, in accordance with 37 C.F.R. § 42.205, that the foregoing **PETITION FOR INTER PARTES REVIEW OF U.S. PATENT 10,951,359** and all supporting exhibits are being served on counsel for patent owner via electronic mail and FEDERAL EXPRESS, costs prepaid, on June 3, 2024, in their entirety on the correspondence address of record of Patent Owner as detailed below:

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Dated: June 3, 2024