

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

QUALCOMM INCORPORATED and
SAMSUNG ELECTRONICS CO., LTD.
Petitioners

v.

NETWORK SYSTEM TECHNOLOGIES, LLC
Patent Owner

Patent No. 7,594,052

Inter Partes Review No. IPR2024-00343

PATENT OWNER'S PRELIMINARY RESPONSE

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LISTING OF EXHIBITS

Exhibit No.	Description
2001	Declaration of Dr. Erik Chmelar
2002	<i>Curriculum vitae</i> of Dr. Erik Chmelar
2003	Neil Weste & David Harris, CMOS VLSI DESIGN: A CIRCUIT AND SYSTEMS PERSPECTIVE (4th ed. 2010)
2004	Jan Rabaey, Anantha Chandrakasan & Borivoje Nikolic, DIGITAL INTEGRATED CIRCUITS: A DESIGN PERSPECTIVE (2nd ed. 2003)
2005	William J. Dally & Brian Towles, <i>Route Packets, Not Wires: On-Chip Interconnection Networks</i> , PROC. 38TH DESIGN AUTOMATION CONF. (2001)
2006	John F. Wakerly, DIGITAL DESIGN: PRINCIPLES AND PRACTICES (4th ed. 2005)
2007	Fayez Gebali, Haytham Elmiligi & Mohamed Watheq El-Kharashi, NETWORKS-ON-CHIPS: THEORY AND PRACTICE (2009)
2008	Kurt Shuler, <i>Busses, Crossbars and NoCs: The 3 Eras of SoC Interconnect History</i> , ARTERISIP (Oct. 22, 2010), https://www.arteris.com/blog/busses-crossbars-and-nocs-the-3-eras-of-soc-interconnect-history/
2009	Kurt Shuler, <i>The SoC Interconnect Fabric: A Brief History</i> , ARTERISIP (Aug. 6, 2013), https://www.arteris.com/blog/the-soc-interconnect-fabric-a-brief-history/
2010	William Stallings, DATA & COMPUTER COMMUNICATIONS (6th ed. 1999)
2011	RESERVED
2012	United States District Courts — National Judicial Caseload Profile
2013	Frank Derfler, Jr. & Les Freed, HOW NETWORKS WORK, Chapter 22 “Repeaters, Bridges, Routers, and Switches” (4th ed. 1998)

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2016	David Patterson and John Hennessey, COMPUTER ORGANIZATION & DESIGN (2nd ed. 1998)
2017-2020	RESERVED
2021	Order Resetting Jury Trial, <i>Network System Technologies, LLC v. Texas Instruments Incorporated</i> , Civil Action No. 2:22-cv-00482-RWS (E.D. Tex.), Dkt. 182 (March 18, 2024)
2022	Claim Construction Order, <i>Network System Technologies, LLC v. Texas Instruments Incorporated</i> , Civil Action No. 2:22-cv-00482-RWS (E.D. Tex.), Dkt. 150 (Jan. 3, 2024)
2023-2026	RESERVED
2027	Complaint, <i>Network System Technologies, LLC v. Samsung Electronics Co., Ltd. et al.</i> , Civil Action No. 2:22-cv-00481-JRG (E.D. Tex.), Dkt. 1 (Dec. 19, 2022)
2028	Docket Control Order, <i>Network System Technologies, LLC v. Samsung Electronics Co., Ltd. et al.</i> , Civil Action No. 2:22-cv-00481-JRG (E.D. Tex.), Dkt. 59 (Jun. 16, 2023)
2029-2032	RESERVED
2033	P.R. 4-3 Claim Construction and Prehearing Statement, <i>Network System Technologies, LLC v. Samsung Electronics Co., Ltd.</i> , Civil Action No. 2:22-cv-00482-RWS (E.D. Tex.), Dkt. 91 (Jan. 9, 2024)
2034	Plaintiff Network System Technologies, LLC's Opening Claim Construction Brief, <i>Network System Technologies, LLC v. Samsung Electronics Co., Ltd.</i> , Civil Action No. 2:22-cv-00482-RWS (E.D. Tex.), Dkt. 100 (Feb. 20, 2024)
2035	Defendant Samsung Electronics Co., Ltd.'s Responsive Claim

Exhibit No.	Description
	Construction Brief, <i>Network System Technologies, LLC v. Samsung Electronics Co., Ltd.</i> , Civil Action No. 2:22-cv-00482-RWS (E.D. Tex.), Dkt. 112 (March 12, 2024)
2036	Plaintiff Network System Technologies, LLC's Reply Construction Brief, <i>Network System Technologies, LLC v. Samsung Electronics Co., Ltd.</i> , Civil Action No. 2:22-cv-00482-RWS (E.D. Tex.), Dkt. 116 (March 19, 2024)
2037	Complaint, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.) Dkt. 1 (Dec. 19, 2022)
2038	First Amended Complaint, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.) Dkt. 57 (Aug. 7, 2023)
2039	Second Amended Scheduling Order, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.) Dkt. 80 (Oct. 23, 2023)
2040	Defendants' Joint Opening Claim Construction Brief, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.), Dkt. 77 (Oct. 12, 2023)
2041	Plaintiff Network System Technologies, LLC's Responsive Claim Construction Brief, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.), Dkt. 81 (Nov. 16, 2023)
2042	Defendants' Joint Reply Claim Construction Brief, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.), Dkt. 83 (Nov. 30, 2023)
2043	Plaintiff Network System Technologies, LLC's Sur-Reply Claim Construction Brief, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.), Dkt. 86 (Dec. 14, 2023)

Exhibit No.	Description
2044	Defendants' Supplemental Claim Construction Brief, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.), Dkt. 105 (Mar. 1, 2024)
2045	Plaintiff Network System Technologies, LLC's Supplemental Claim Construction Brief, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.), Dkt. 106 (Mar. 1, 2024)
2046-2049	RESERVED
2050	Defendants' Invalidity and Ineligibility Contentions And Disclosures Pursuant to Patent Rule 3-3 Cover Pleading, <i>Network System Technologies, LLC v. Samsung Electronics Co., Ltd., et al.</i> , Civil Action No. 2:22-cv-00481-JRG (E.D. Tex.) (July 11, 2023)
2051	Defendants' Invalidity Contention Cover Pleading, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.) (September 22, 2023)
2052	Network System Technologies, LLC's Supplemental Claim Construction Brief Regarding Claim Construction Rulings Made In Related Case, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.)(March 1, 2024)
2053-2054	RESERVED
2055	Exhibit C-1 to Defendants' Invalidity Contentions, <i>Network System Technologies, LLC v. Samsung Electronics Co., Ltd., et al.</i> , Civil Action No. 2:22-cv-00481-JRG (E.D. Tex.) (July 11, 2023)
2056	Exhibit C-1 to Defendants' Invalidity Contentions, <i>Network System Technologies, LLC v. Qualcomm Incorporated, et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.) (Sep. 22, 2023)
2057	Exhibit C-18 to Defendants' Invalidity Contentions, <i>Network System Technologies, LLC v. Qualcomm Incorporated, et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.) (Sep. 22, 2023)

Network System Technologies, LLC (“NST” or “Patent Owner”) submits this preliminary response under 37 C.F.R. § 42.207 to the Petition for *Inter Partes* Review (“Petition”) of U.S. Patent No. 7,594,052 (“the ‘052 Patent”), filed by Qualcomm Incorporated (“Qualcomm”) and Samsung Electronics Co., Ltd. (“Samsung”) (collectively, “Petitioners”).

I. INTRODUCTION

Patent Owner respectfully requests that the Board deny institution. The Board should exercise its discretion to deny institution pursuant to 35 U.S.C. § 314(a) in light of co-pending litigation between Petitioners and Patent Owner in the Eastern and Western District of Texas involving the ‘052 patent. The Samsung litigation is set for trial prior to the time of a final written decision, and claim construction will be fully briefed and argued before an institution decision. The Qualcomm litigation is expected to be set for trial prior to the time of a final written decision, and claim construction has been fully briefed and argued. On balance, the factors set forth in the Board’s precedential *Fintiv* decision weigh in favor of denying discretion.

The Board should also exercise its discretion to deny institution based on 35 U.S.C. § 325(d). The reference Petitioners rely on for Grounds 1 and 2 is nearly identical to the references relied on the examiner during prosecution of the ‘052 Patent.

Petitioners have also not demonstrated a reasonable likelihood of success on the merits. Petitioners have failed to show that a key limitation is present in each of the independent claims for each of the presented grounds. The same limitations were the basis for allowance during examination.

Accordingly, Patent Owner respectfully submits that institution should be denied.

II. RELATED MATTERS

The '052 Patent is asserted in five district court proceedings in the Eastern and Western Districts of Texas. Petition, 79.

A. The Samsung Litigation

As of this Response, claims 1-7 of the '052 Patent are asserted against Petitioner in *Network System Technologies, LLC v. Samsung Electronics Co., Ltd. et al.*, No. 2:22-cv-00481-JRG (E.D. Tex.) (hereinafter, "the Samsung Litigation"). A jury trial is scheduled for October 28, 2024. EX2028, 1.

The parties filed a Joint Claim Construction and Prehearing Statement with disputed and agreed claim constructions for the '052 Patent on January 10, 2024. EX2033. Patent Owner's Opening Claim Construction Brief was filed February 20, 2024 (EX2034), Petitioner's Responsive Claim Construction Brief was filed March 12, 2024 (EX2035), and Patent Owner's Reply Claim Construction Brief was filed

March 19, 2024 (EX2036). EX2028. A *Markman* hearing is scheduled for April 9, 2024. EX2028, 3.

B. The Qualcomm Litigation

As of this Response, claim 6 of the '052 Patent is asserted in *Network System Technologies, LLC v. Qualcomm Inc. et al.*, No. 2:22-cv-01331-DAE (W.D. Tex.) (hereinafter, "the Qualcomm Litigation"). There is no trial date yet, but it is expected to be in early 2025. EX2039.

The parties completed claim construction briefing (EX2040-EX2043) and conducted a *Markman* hearing on February 21, 2024. EX2044, 1. The parties submitted supplemental claim construction briefs on March 1, 2024. EX2044. EX2045.

C. The TI Litigation

As of this Response, claim 6 of the '052 Patent is asserted in *Network System Technologies, LLC v. Texas Instruments, Inc.*, No. 2:22-cv-00482-RWS (E.D. Tex.) (hereinafter, "the TI Litigation"). A jury trial is scheduled for November 4, 2024, 2024. EX2021. The court issued a *Markman* order on January 3, 2024 construing several terms in the '052 Patent. EX2022.

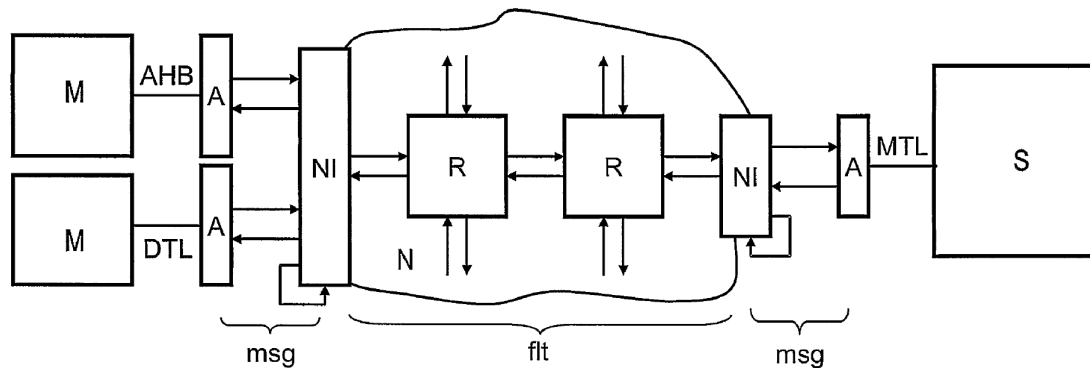
D. The Lenovo, Ford and OnePlus Litigations

As of this Response, the '052 Patent is asserted in *Network System Technologies, LLC v. Lenovo Group Ltd.*, No. 2:23-cv-00167-JRG (E.D. Tex.),

Network System Technologies, LLC v. Ford Motor Co., No. 2:23-cv-00440-DAE (W.D. Tex.), and *Network System Technologies, LLC v. OnePlus Technology (Shenzhen) Co., Ltd.*, 2:23-cv-00520 (E.D. Tex.). These cases are currently stayed.

III. OVERVIEW OF THE '052 PATENT

The '052 Patent discloses an integrated circuit, facilitating efficient communication service mapping within an on-chip network. EX2001, ¶63. The '052 Patent discloses “an integrated circuit having a plurality of processing modules and an interconnect means for coupling said plurality of processing modules and a method for communication service mapping in such an integrated circuit.” EX1001, 1:6–10. For example, Figure 1 (reproduced below) of the '052 Patent shows an embodiment comprising two master modules, a slave module, and two network interfaces where “[e]ach module M, S is connected to a network N via its associated network interface NI, respectively, i.e. the network interfaces NI are used as interfaces between the master and slave modules M, S and the network N.” *Id.*, 5:6–16. EX2001, ¶60. Adapter units A are positioned between the network interfaces and their associated master (M) and slave (S). *Id.* Furthermore, the adapter units A can also be arranged in the network interface. *Id.*



EX1001, FIG. 1

A further innovation is highlighted by the interaction between the master module (M) and the slave module (S). EX2001, ¶61. The '052 Patent discloses that the “master module M requests a communication service, i.e. a request is issued to the slave module S.” EX1001, 5:53–54. “The slave S receives the request and performs the respective processings based on the received command and returns a response.” *Id.*, 5:55–58. “The adapter units A serve to connect the IP and their communication protocol to the network interface which in turn serve to connect to the network N.” *Id.*, 5:58–61. Accordingly, “the adapter units A translate the requested communication service into messages msg, which are processed by the network interface NI and are translated into flits fit to be transmitted over the network N, in particular the adaptor unit A maps the identification means of these protocols to connections.” *Id.*, 5:61–66. “The identification means in the existing protocols are: communication threads and addresses, i.e. the threads or addresses are

mapped to connections through the interconnect based on specific connection properties.” *Id.*, 5:66–6:3.

Moreover, the ‘052 Patent describes that “[a] communication thread can be directly mapped on a connection, i.e. one thread to one connection,” “[w]here communication threads are used to identify traffic classes of a communication based on specific communication parameters, such a thread and the associated traffic class can be mapped to a connection based on specific corresponding connection properties.” *Id.*, 7:41–48.

Thus, the ‘052 Patent discloses “an integrated circuit including an on-chip network where the interfaces between modules and the network are configured to map between a requested communication service and specific connection properties.” EX2001, ¶63.

IV. THE ‘052 PATENT’S PROSECUTION HISTORY

The ‘052 Patent issued from U.S. Application No. 10/598,795 (“the ’795 application”).

During prosecution of the ’795 application, the Examiner initially rejected the pending claims under 35 U.S.C. § 102(b) as being anticipated by the *Æthereal* Network-on-Chip (NoC) (“*Æthereal*”) as disclosed in “Concepts and Implementation of the Philips Network-on-Chip” by Dielissen et al. (“*Dielissen*”,

EX1011) and “Communication Services for Networks on Chip” by Radulescu et al. (“Rădulescu2000”, EX1010). EX1002, 76-83.

In response, Applicant argued that both Dielissen and Radulescu2000 “fail to disclose or suggest ‘a mapping mean (A) for mapping the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties according to said at least one communication service identification,’ as recited in claim 1.” EX1002, 108-111.

Subsequently, the Examiner issued a Final Rejection that maintained the initial rejection. EX1002, 117-124. In response, Applicant amended the claims to recite “wherein said at least one communication service identification comprises at least one communication thread or at least one address range, said address range for identifying one or more second processing modules (S) or a memory region within said one or more second processing modules (S).” EX1002, 137-144. Applicant further stated:

Applicants respectfully submit that Radulescu [sic] at pages 287-288 is not describing a mapping means but it instead describing a fixed hardware configuration between IPs and network NI ports (NIP) that is required to be set up a-priori to receiving service requests during an operational stage. In fact, Radulescu [sic] teaches at page 288, second full paragraph, that AThe real connections must be created with the desired properties before being used (i.e. prior to mapping communication service requests).

Applicants respectfully submit that, in contrast to Radulescu [sic], the invention is based on the idea of offering differentiated services for protocols such as DTL, MTL, AXI, and OCP, by mapping the

identification means of these protocols to connections. The identification means in the existing protocols are: communication threads and addresses, i.e. the threads or addresses are mapped to connections through the interconnect based on specific connection properties. Applicant submits that this is different from Radilscu [sic] which describes end-to-end flow control and guaranteed throughputs, but is silent with respect to offering differentiated services for protocols such as DTL, MTL, AXI, and OCP, by mapping the identification means of these protocols to connections.

Id.

Following the May 11, 2009 amendment and response, the Examiner allowed the '795 application, leading to the issuance of the '052 Patent. EX1002, 149.

V. LEVEL OF SKILL IN THE RELEVANT FIELD OF ART

With respect to the '052 patent, the District Court in the TI Litigation adopted the following definition a person of ordinary skill in the art ("POSITA"): "a POSITA would have at least a Bachelor's degree in electrical engineering, computer engineering, or a related field, and as at least two years of work experience in the field of SoC [("system-on-chip")] and NoC [("Network-on-Chip")] technologies." EX2022, 18; EX2001, ¶38. Patent Owner respectfully submits the District Court's definition of a POSITA should be adopted in this proceeding.

VI. CLAIM CONSTRUCTION

Patent Owner submits that the Board should adopt Patent Owner's constructions of certain limitations as set forth below.

A. “interconnect means” (claims 1 and 6-7)

In this proceeding, the parties dispute the construction of “interconnect means”:

Term	Petitioners' Proposed IPR Construction	NST's Proposed IPR Construction
“interconnect means”	Subject to Section 112 ¶ 6 Function (claims 1, 6, and 7): coupling said plurality of processing modules (M, S). Function (claims 1 and 7): enabling a connection based communication having a set of connection properties Structure: any of a bus, switch, point-to-point wire, or network.	“multi-hop interconnection between modules separated by one or more network nodes”

Petition, at 10.

In the Samsung Litigation, NST proposed the same construction it proposes here. Samsung initially argued that the construction of “interconnect means” should be plain and ordinary meaning but later agreed to NST's construction of “interconnect means”. EX2033, 12; EX2035, 2, n.2. In the Qualcomm litigation, the parties proposed the same constructions they propose here. EX2040, 22.

The TI Order construed “interconnect means” to mean “multi-hop interconnection between modules separated by one or more network nodes.” EX2022, 51. NST agrees with this construction and the TI Order's rationale. “In

construing claim terms, “the Board will consider any prior claim construction determination in a civil action or ITC proceeding if a federal court or the ITC has previously construed a term of the involved claim using the same standard.” PTAB Consolidated Trial Practice Guide (“2019 TPG”), 47.

In so holding, the TI Order reviewed the specification and figures of the '052 Patent and recognized that the patentees used the term “interconnect means” and the term “network” interchangeably in the specification. EX2022, 47-49; *see also* EX1001, 5:12-31 (“Each module M, S is connected to a **network N** via its associated network interface NI”); EX1001, 10:19-20 (“coupling said plurality of processing modules (M,S) by an **interconnect means (N)**”); EX1001, 10:25-26 (“interconnect means (N) by at least one network interface (NI)”). The TI Order construed “network” to mean “multi-hop interconnection between modules separated by one or more network nodes.” EX2022, 24. This is the same definition that the Parties stipulated for “network.” *See* EX2022, 6. Thus, based on its recognition that the terms “interconnect means” and “network” are used interchangeably in the '052 Patent, the TI Order gave “interconnect means” the same construction as “network”: **“multi-hop interconnection between modules separated by one or more network nodes.”** EX2022, 51 (emphasis in original). As noted above, NST agrees with this construction. This is consistent with the Federal Circuit’s holding the “interchangeable use of the two terms is akin to a definition equating the two.”

Edwards Lifesciences LLC v. Cook Inc., 582 F.3d 1322, 1329 (Fed. Cir. 2009). The TI Order and NST's proposed construction is also consistent with the disclosure of the '052 Patent. "At the time of the invention, on-chip networks were just emerging as an intersection of computer networks and microchip design." EX2005, § 1; EX2001, ¶77. "Also, at the time of invention, computer networks and other off-chip networks were well-known and understood." EX2001, ¶79; EX1001, 1:56–62.

Based on the intrinsic evidence of the '052 Patent, the interconnect means does not describe a direct interconnection, e.g., a shared bus; rather, it describes an indirect interconnection, e.g., a network. EX2001, ¶80. In the '052 Patent, "FIG. 1 shows a network on chip according to a first embodiment." EX1001, 5:6–7, 4:30–31. FIG. 1 is reproduced below, with annotation in yellow.

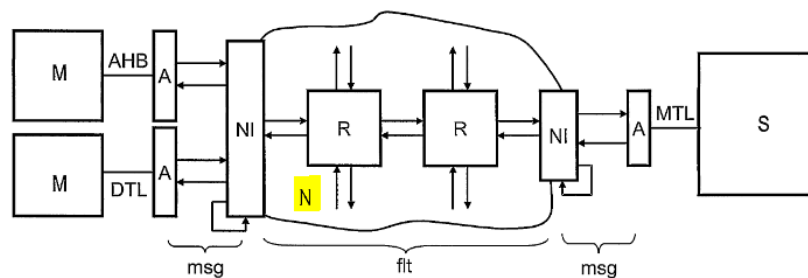


FIG.1

EX1001, FIG. 1

"According to the description of FIG 1, the portion labeled 'N' between the network interfaces corresponds to a network having a plurality of routers for

transporting data packets.” EX2001, ¶83. “The network N may be comprised of a plurality of interconnected network routers R” EX1001, 5:24–31.

Similarly, according to the description of FIG. 4, “[t]he network on chip comprises a master M and two slaves S1, S2 each being connected to a network via a network interface NI, respectively.” EX1001, 8:9–12. Although FIG. 4 does not illustrate routers in the network N, this can be reasonably expected at least because “FIG. 4 is provided for illustrating the mapping operation of the network interfaces, not for illustrating a topology of the network.” EX2001, ¶85; EX1001, 8:7–9; EX1001, 5:27–28.

Accordingly, the network N interconnects modules (M to S in FIG. 1 and M to S1, S2 in FIG. 4). EX2001, ¶86. The specification ascribes the same function to the interconnect means. EX1001, Abstract, 1:7-8, 3:51–54, 4:1–4, 3:18–22; EX2001, ¶86. “[A] POSITA would understand that the network N and the interconnect means (N) describe the same thing.” *Id.*

A POSITA would also understand that a connection-based communication, which may include the connection properties described in the '052 Patent is not normally associated with direct interconnections, such as shared buses. EX2001, ¶88. Given that the “interconnect means” enables a connection-based communication, a POSITA would understand “interconnect means” to describe “a network comprising indirect interconnections between modules, not a direct

interconnection between modules.” *Id.* This is consistent with FIG. 1, which shows a network N that includes interconnected routers R for transporting data packets, illustrating a multi-hop network where modules are linked through various network nodes. EX1001, 2:33–36; EX2001, ¶89. Thus, a POSITA would understand that network N and the “interconnect means” is a “multi-hop interconnection between modules separated by one or more network nodes.” EX2001, ¶90.

Petitioners propose that “interconnect means” is subject to § 112, ¶6 and the proposed structure is “bus, switch, point-to-point wire, or network.” Petition, 10. TI, like Samsung initially, proposed that “interconnect means” be given its “plain and ordinary meaning,” which the TI Order observed would include “existing on-chip interconnects (e.g., buses, switches, or point-to-point wires).” EX2022, 51. The TI Order held that a construction that included such structures “would be inconsistent with the intrinsic evidence” and rejected TI’s construction (and, by extension, Petitioners’ construction) on that basis. *Id.*

Petitioner’s § 112 ¶6 construction is also unavailing because the ’052 Patent discloses that the “interconnect means” is part of an “integrated circuit,” which is intrinsically structural according to Federal Circuit precedent. *See, e.g., Power Integrations, Inc. v. Fairchild Semiconductor Int’l, Inc.*, 711 F.3d 1348, 1364 (Fed. Cir. 2013) (“[w]e have previously held on several occasions that the term ‘circuit’ connotes structure”); *see also Linear Tech. Corp. v. Impala Linear Corp.*, 379 F.3d

1311, 1320-21 (Fed. Cir. 2004) (holding that the term “circuit” is not a means-plus-function limitation when the patent provides “a recitation of the respective circuit’s operation in sufficient detail to suggest structure to persons of ordinary skill in the art”); *Apex Inc. v. Raritan Computer, Inc.*, 325 F.3d 1364, 1373 (Fed. Cir. 2003) (“[T]he term ‘circuit’ with an appropriate identifier such as ‘interface,’ ‘programming’ and ‘logic,’ certainly identifies some structural meaning to one of ordinary skill in the art.”); *Mass. Inst. Of Tech. v. Abacus Software*, 462 F.3d 1344, 1356 (Fed. Cir. 2006) (“The claim language here too does not merely describe a circuit; it adds further structure by describing the operation of the circuit.”); *Lighting World, Inc. v. Birchwood Lighting, Inc.*, 382 F.3d 1354, 1359-60 (Fed. Cir. 2004) (“In considering whether a claim term recites sufficient structure to avoid application of § 112 ¶6, we have not required the claim term to denote a specific structure. Instead, we have held that it is sufficient if the claim term is used in common parlance or by persons of skill in the pertinent art to designate structure, even if the term covers a broad class of structures and even if the term identifies the structures by their function”) (overturned on other grounds). For instance, the ’052 Patent’s Abstract expressly discloses that the “interconnect means” is part of an “integrated circuit”: “[t]he invention relates to *an integrated circuit* having a plurality of processing modules *and an interconnect means.*” See EX1001, Abstract. Claim 6 further supports the fact that the “interconnect means” is part of an “integrated

circuit” by reciting a “[m]ethod of communication service mapping *in an integrated circuit.*” *Id.*, 3:7-8, 3:45-46. Each step is performed *in an integrated circuit*, including “coupling said plurality of processing modules (M,S) *by an interconnect means (N)*” and “controlling the communication between said at least one first of said plurality of processing modules (M) and said *interconnect means (N).*” *Id.*, 10:19-25. To remove any doubt, Claim 1 makes it abundantly clear by reciting an “[i]ntegrated circuit, comprising . . . *an interconnect means (N)* for coupling said plurality of processing modules (M, S).” *Id.*, Claim 1; *see also id.*, Claim 6 (“**integrated circuit**, having a plurality of processing modules (M,S)...coupling said plurality of processing modules **by an interconnect means (N)**”). Thus, an “interconnect means” is intrinsically structural for being part of an integrated circuit.

Petitioners’ proposed structure of a “bus, switch, point-to-point wire, or network” is also incorrect. It directly conflicts with the ’052 Patent’s specification, which Petitioners admit repeatedly distinguishes the patented NoC technology from “buses, switches, or point-to-point wires.” *See* EX2042, 13 (citing EX1001, 1:50-54 (“in contrast to existing on-chip interconnects (*e.g., buses, switches, or point-to-point wires*), where the communicating modules are directly connected, in a NoC the modules communicate remotely via network nodes.”)); *id.* (citing EX1001, 2:31-33 (“Introducing networks as on-chip interconnects radically changes the communication when *compared to direct interconnects, such as buses or*

switches.”)); *id.* (citing EX1001, 2:36-38 (“This is in contrast with the prevalent existing interconnects (*i.e.*, *buses*)”)); *id.* (citing EX1001, 4:46-50 (“The interconnect is embodied as a network on chip NOC, allowing communication between all aforementioned modules. The network on chip may include wires, bus, time-division multiplexing, switches, and/or routers within a network.”); *id.* (citing EX1001, 1:25-27 (“In conventional processing systems the systems modules usually communicate to each other via a bus.”)). It is incorrect to read the “interconnect means” of the ’052 Patent to cover these distinguished and disparaged structures. *Openwave Sys. v. Apple Inc.*, 808 F.3d 509, 517 (Fed. Cir. 2015) (“it is difficult to envisage how, in light of the repeated disparagement of mobile devices with ‘computer modules’ discussed above, one could read the claims of the patents-in-suit to cover such devices); *SciMed Life Sys. v. Advanced Cardiovascular Sys.*, 242 F.3d 1337, 1343 (Fed. Cir. 2001) (“Thus, the SciMed patents distinguish the prior art on the basis of the use of dual lumens and point out the advantages of the coaxial lumens used in the catheters that are the subjects of the SciMed patents. That discussion in the written description supports the district court’s conclusion that the claims should not be read so broadly as to encompass the distinguished prior art structure.”)).

B. “mapping means” (claims 1 and 7)

In this proceeding, the parties dispute the construction of the claimed “mapping means”:

Term	Petitioners' Proposed IPR Construction	Patent Owner's Proposed IPR Construction
“mapping means (A) for mapping the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties according to said at least one communication service identification”	Subject to Section 112, ¶6 Function: “mapping the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties according to said at least one communication service identification.” Structure: adapter unit/shell comprising a sequentializing unit and a desequentializing unit as disclosed in the '052 Patent at 5:58–6:3, 6:30–7:14, Figs. 2A, 2B and 3.	“mapping means” means “circuit configured to map a requested communication service to a connection,” NST incorporates the agreed upon definition for the term “connection properties,” (the discussion is shown below), and the remaining language should be afforded their plain and ordinary meanings. NST disagrees that this term is governed by Section 112 ¶6. Nevertheless, if the Board determines that this term is so governed, NST proposes the following construction: Function: “mapping the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties according to said at least one communication service identification” Structure: “circuit”

Petition, 11-12.

In the Samsung litigation, Samsung also argued that the “mapping means” is a term subject to § 112, ¶ 6 but also argued that the term was, otherwise, indefinite. EX2033, Appendix 2. In the Qualcomm litigation, Qualcomm did not propose a construction for the “mapping means.” EX2040.

The board should adopt NST's proposed construction because it reflects the correct understanding that a POSITA would have of this term. EX2001, ¶93. “The '052 Patent describes the mapping means as a circuit.” EX2001, ¶94. For example, claim 1 recites an “[i]ntegrated circuit, comprising: ...a mapping means (A) . . .” EX1001, 9:25–41 (emphasis added). Therefore, a POSITA would understand that a mapping means is interconnected circuitry of the integrated circuit. EX2001, ¶94.

Furthermore, the '052 Patent illustrates that the mapping means is included in the network interface, *i.e.*, a circuit within the integrated circuit, reinforcing that the mapping means is circuitry. EX2001, ¶95. The specification of the '052 Patent states, for example, “said at least one network interface comprises a mapping means,” (EX1001, 3:22–23), and “said mapping means is arranged in said at least one network interface.” (EX1001, 3:30–31). Claim also 1 recites an “[i]ntegrated circuit, comprising: ...at least one network interface (NI) . . .” EX1001, 9:25–36 (emphasis added); *see also id.*, 8:9–12 (“The network on chip comprises a master M and two slaves S1, S2 each being connected to a network via a network interface NI,

respectively.”); *id.*, 2:18–21; *id.*, 5:6–8. Thus, “a POSITA would understand that the mapping means comprised in the network interface discloses that the mapping means is circuitry of the network interface, i.e., the mapping means is a circuit.” EX2001, ¶95.

The '052 Patent consistently treats the mapping means as hardware, positioned physically within the integrated circuit and contributing to its functionality. EX2001, ¶96. For example, the specification of the '052 Patent describes the “adapter unit A,” i.e., the “mapping means (A),” as being *between* a network interface and its associated master and slave (or arranged in the network interface, as described above). *Id.*; EX1001, 5:9–13; EX1001, 6:36–38; FIGS. 2A–2B (blocks labeled “A”), and FIG. 3 (blocks labeled “DTL-A” and “AXI-A”). A POSITA would understand the above “indications of placement and area to mean that the mapping means is a physical circuit that is comprised in the integrated circuit.” EX2001, ¶96.

Additionally, the '052 Patent discloses the mapping means is embodied by hardware. EX2001, ¶97; EX1001, 9:15–17 (“In the device claim enumerating several means, several of these **means can be embodied by one and the same item of hardware.**”) (emphasis added); *see also id.*, 1:35–39, 2:18–21.

The '052 Patent describes the “mapping means” consistent with NST’s construction as a “circuit configured to map a requested communication service to a

connection.” EX2001, ¶99; EX1001, Abstract (“a mapping means (A) is provided for mapping the requested at least one communication service . . . to a connection,”); EX1001, 3:22–25 (“said at least one network interface comprises a mapping means for mapping the requested at least one communication service . . . to a connection,”); EX1001, 4:7–11. Therefore, a POSITA would understand the “mapping means” is a “circuit configured to map a requested communication service to a connection,” as proposed by NST. EX2001, ¶52.

Petitioners’ argument that “mapping means” should be construed as part of a larger phrase under § 112, ¶ 6 is incorrect. The presumption that the word “means” subjects a claim term to interpretation under § 112, ¶ 6 is rebutted where the phrase describes structure. *Skky, Inc. v. MindGeek s.a.r.l.*, 859 F.3d 1014, 1020 (Fed. Cir. 2017) (finding “‘wireless device means’ does not invoke § 112, ¶ 6 because its clause recites sufficient structure”); *see also Power Integrations*, 711 F.3d at 1364 (“We have previously held on several occasions that the term ‘circuit’ connotes structure.”); *Mass. Inst.*, 462 F.3d at 1355 (“[T]he term ‘circuit,’ combined with a description of the function of the circuit, connoted sufficient structure to one of ordinary skill in the art to avoid 112 P6 treatment.”); *Linear Tech.*, 379 F.3d at 1320–21 (holding that the term “circuit” is not a means-plus-function limitation when the patent provides “a recitation of the respective circuit's operation in sufficient detail to suggest structure to persons of ordinary skill in the art”); *Apex*, 325 F.3d at 1373

(“[T]he term ‘circuit’ with an appropriate identifier such as ‘interface,’ ‘programming’ and ‘logic,’ certainly identifies some structural meaning to one of ordinary skill in the art.”). Here, the claim language expressly describes sufficient structure by reciting that the “mapping means” is part of an “integrated circuit.” EX1001, Claim 1 (an “integrated circuit comprising ... a mapping means.”). Moreover, the “network interface,” which Defendants do not assert to be non-structural and subject to § 112, ¶6, is disclosed in one embodiment as “compris[ing] a mapping means for mapping the requested at least one communication service.” EX1001, 3:23-24. Construing “mapping means” to be non-structural and subject to § 112, ¶6—where there is no dispute that network interface is a known structure—is irreconcilable with the patent’s disclosure that the network interface hardware may comprise the “mapping means.” Because sufficient structure is disclosed, § 112, ¶6 does not apply.

If the Board determines that this term should be construed under 35 U.S.C. § 112 ¶6, means-plus-function, NST’s proposed structure of a “circuit” is correct. Petitioners’ proposed structure is not correct. EX2001, ¶101. As Dr. Chmelar explains, Petitioners’ proposed structure unreasonably narrows the scope of the “mapping means.” EX2001, ¶104. The intrinsic evidence assigns various structures that can perform the agreed upon function of the claimed “mapping means,” including an “adapter unit A” (EX1001, 5:10, 5:12, 5:58, 5:61, 6:34, 6:37, and 6:41)

and “shell A” (EX1001, 6:46, 6:41-42 (“these adapter units A may also be considered as shells ...”). EX2001, ¶104. A POSITA would not understand the intrinsic evidence to limit the structure of the “mapping means” to “a sequentializing unit and a desequentializing unit,” as Petitioners suggest. *Id.*

Petitioners' construction additionally suffers insofar as its construction of “mapping means” seeks to incorporate specification passages, thereby inserting additional *functional* limitations contained in these specification passages (e.g., describing “packetization/depacketization,” “schedules,” and “implement the connections”). However, this is impermissible and erroneous. *Micro Chem., Inc. v. Great Plains Chem. Co.*, 194 F.3d 1250 (Fed. Cir. 1999) (holding § 112, ¶ 6 “does not permit limitation of a means-plus-function claim by adopting a function different from that explicitly recited in the claim”).

A POSITA would readily understand that a “circuit” performs the function of the “mapping means.” EX2001, ¶105. In particular, a POSITA would understand that mapping is performed using well-known structures such as mapping logic, *i.e.*, digital logic circuitry, gates, or look-up tables, *i.e.*, memory circuitry. *Id.* Moreover, claim 1 requires the mapping means to map “the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties according to said at least one communication service identification.” EX1001, claim 1. While the mapping may

involve sequentializing and desequentializing, by “a sequentializing unit and a desequentializing unit,” a POSITA would recognize that the mapping means is not so limited. EX2001, ¶105.

Accordingly, if the Court construes “mapping means” under § 112, ¶6, the Court should reject Defendants’ overly narrow construction and adopt NST’s proposed construction.

C. “connection” (claims 1, and 3-7)

In the Samsung Litigation, the parties did not seek construction of “connection.” In the Qualcomm Litigation, the parties proposed the following constructions for “connection.” EX2040, 6.

Term	Qualcomm’s Construction	Patent Owner’s Construction
“connection”	“one or more channels, each having a set of connection properties, between a first module and at least one second module, that are created before use and closed after use”	“one or more communication channels”

NST’s proposed construction is the correct construction of “connection.” NST’s construction reflects the understanding of a POSITA in light of the specification of the ‘052 Patent. EX2001, ¶111. Petitioner’s construction, on the other hand, improperly seeks to import an additional *functional* limitation that the connections “are created before use and closed after use,” which is neither required by the claims nor mentioned in the specification. *Id.* ¶112-113. Importing limitations from a patent’s specification is prohibited. It is a fundamental error of claim

construction to import limitations from the specification into the claims. *CollegeNet, Inc. v. ApplyYourself, Inc.*, 418 F.3d 1225, 1231 (Fed. Cir. 2005) (“[i]n examining the specification for proper context, however, this court will not at any time import limitations from the specification into the claims”); *King Pharms., Inc. v. Eon Labs, Inc.*, 616 F.3d 1267, 1275 (Fed. Cir. 2010) (“[i]t would be improper to limit the broad terms used in the [...] patent’s claims to the specific [...] conditions disclosed in the written description.”). Petitioner’s construction must be rejected.

Instead, NST’s proposed construction of “connection” as “one or more communication channels” is supported by the specification. EX2001, ¶112 (citing EX1001, 4:53–55, 10:7–30 (claim 6), 8:47–51, 4:53–55). NST’s proposed construction is also supported by extrinsic evidence. EX2001, ¶115–116 (citing EX2014, 6–11). A POSITA understands that a communication channel is a channel for the transmission of information (e.g., data), and the channel can include physical and virtual aspects. *Id.* A POSITA understands that a physical aspect of a channel may include a physical medium, such as a wire. *Id.* Further, a POSITA understands that a virtual aspect of a channel may include a virtual-circuit configuration of a connection-oriented service. *Id.*; EX2010, 11.

Thus, the correct understanding that a POSITA would have of this term as used in the Asserted Patents, is the meaning provided by NST.

D. Agreed District Court Constructions

Patent Owner identifies several claim terms with agreed claim constructions in pending district court litigations below. Although constructions of these terms are not necessary for the Board to deny institution, the Board should construe these terms according to the agreed claim constructions in this IPR.

1. The preamble

In the Qualcomm and Samsung Litigations, the parties agreed that the preamble of claim 6 should be construed as limiting. EX2033, Appendix 1; EX2040, 5-6. The same construction was adopted by the district court in the TI Litigation. See EX2022, 58.

2. “connection properties” (claims 1, 3-7)

In the Qualcomm and Samsung Litigations, the parties agreed that “connection properties” should be construed as “properties of a connection, including ordering (data transport in order), flow control (a remote buffer is reserved for a connection, and a data producer will be allowed to send data only when it is guaranteed that space is available for the produced data), throughput (a lower bound on throughput is guaranteed), latency (upper bound for latency is guaranteed), the lossiness (dropping of data), transmission termination, transaction completion, data correctness, priority, or data delivery.” EX2033, Appendix 1; EX2040, 6. The same construction was adopted by the district court in the TI Litigation. See EX2022, 57.

3. “integrated circuit” (claims 1-6)

In the Qualcomm and Samsung Litigations, the parties agreed that the term “integrated circuit” should be construed as “interconnected circuitry on a chip.” EX2033, Appendix 1; EX2040, 6. The district court in the TI Litigation construed “integrated circuit” as “a combination of interconnected circuit elements inseparably associated on or within a continuous substrate.” EX2022, 59.

VII. THE BOARD SHOULD DENY INSTITUTION PURSUANT TO 35 U.S.C. 314(a)

A. The Board Has Discretion to Deny Institution

The Board is granted the discretion to decline to institute *inter partes* review whenever it deems the circumstances warrant doing so. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1367 (Fed. Cir. 2016) (“the PTO is permitted, but never compelled, to institute an IPR proceeding”); *see also* 35 U.S.C. § 314(a); *Oil States Energy Servs. LLC v. Green’s Energy Grp., LLC*, 138 S. Ct. 1365, 1371 (2018) (“The decision whether to institute *inter partes* review is committed to the Director’s discretion.”). The Board has declined to institute in cases where a parallel district court trial would determine the issues *before* the requested Board trial, rendering the review cumulative.

The Board considers the following set of six nonexclusive factors to determine on a case-by-case basis whether to deny institution based on a parallel proceeding:

1. whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted;
2. proximity of the court's trial date to the Board's projected statutory deadline for a final written decision;
3. investment in the parallel proceeding by the court and the parties;
4. overlap between issues raised in the petition and in the parallel proceeding;
5. whether the petitioner and the defendant in the parallel proceeding are the same party; and
6. other circumstances that impact the Board's exercise of discretion, including the merits.

Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation, dated June 21, 2022 (available at https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621.pdf) (“Interim Guidelines”); *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 5-6 (PTAB Mar. 20, 2020) (precedential) (hereinafter, “*Fintiv*”); *see also Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 15 (PTAB May 13, 2020) (informative) (applying the *Fintiv* factors and denying institution) (hereinafter, “*Fintiv II*”).

Where *Fintiv* factors 1-5 favor discretionary denial, a Petitioner must meet a higher standard for institution; they must present a compelling, meritorious, challenge to the patentability of at least one claim. *CommScope Technologies, LLC v. Dali Wireless Inc.*, IPR2022-01242, Paper 23 at 4-5 (PTAB Feb. 27, 2023) (“In circumstances where, however, the Board’s analysis of *Fintiv* factors 1–5 favors denial of institution, the Board shall then assess compelling merits.”), *OpenSky Indus., LLC v. VLSI Tech. LLC*, IPR2021-01064, Paper 102, 49 (PTAB Oct. 4, 2022) (“[A] compelling-merits challenge is a higher standard than the reasonable likelihood required for the institution of an IPR under 35 U.S.C. § 314(a).”) A “[c]ompelling, meritorious challenges are those in which the evidence, if unrebutted at trial, would plainly lead to a conclusion that one or more claims are unpatentable by a preponderance of the evidence.” *Id.*, 50. “A challenge can only ‘plainly lead to a conclusion that one or more claims are unpatentable’ if it is highly likely that the petitioner would prevail with respect to at least one challenged claim.” *Id.*, 50. For the reasons discussed above, Petitioner has not presented a compelling challenge to the patentability of at least one claim. *Supra*, §VI-VII.

Patent Owner respectfully asserts that the Interim Guidelines are improper because the *Fintiv* instructions were issued in violation of the notice-and-comment rulemaking set forth in 5 U.S.C. § 553(b). Under the APA, the Director may adopt substantive rules only through notice-and-comment rulemaking. *See* 5 U.S.C. § 553.

In particular, Patent Owner respectfully submits that the Interim Guidelines statement that a *Sotera* stipulation alone (factor 4) is sufficient for discretionary denial is improper and inconsistent with the statute. *See* Interim Guidelines, pp. 7-8. Patent Owner also respectfully submits that the compelling evidence standard (factor 6) is also improper and inconsistent with the statute. *See* Interim Guidelines, pp. 3-5.

The legality of the Interim Guidelines is currently being challenged in *Apple Inc. v. Iancu*, No. 5:20-cv-06128-EJD (N.D. Cal.). The Federal Circuit has remanded the case to the district court to review the specific issue of whether the Interim Guidelines were issued without compliance with notice-and-comment rulemaking requirements under the APA. The parties in that case are currently awaiting the district court's opinion on cross-motions for summary judgment, which is expected to address the merits of this remaining challenge to the Interim Guidelines. If the district court finds that Interim Guidelines were issued in violation of the APA's notice-and-comment procedures, it could invalidate or limit the application of the Interim Guidelines in these IPR proceedings.

In light of these concerns and the ongoing *Apple Inc. v. Iancu* case, Patent Owner respectfully requests that the Board refrain from relying on the Interim Guidelines in its decision on whether to institute IPR in this case. Instead, Patent Owner respectfully submits the Board should focus its analysis on the statutory

requirements for institution set forth in 35 U.S.C. § 314. Nevertheless, should the Board choose to apply the Interim Guidelines, Patent Owner maintains that the factors outlined in the rule favor denying institution here.

B. Parallel District Court Proceedings Will Determine the Issues Raised in the Petition Before the Board

Contrary to Petitioners' assertions that the district court proceedings are relatively early (Petition, 78), they are currently at a relatively advanced stage.

Claim 6 of the '052 patent is currently asserted in co-pending litigation between Patent Owner and Petitioner Qualcomm in Federal District Court in the parallel Qualcomm litigation. EX2038, 24-30. The case was initiated on December 19, 2022. EX2037. Infringement contentions were served May 26, 2023; Invalidity contentions were served September 22, 2023; and, a *Markman* hearing was held on February 21, 2024. EX2039, 6. The claim construction order is imminent. Fact discovery will be nearly complete by the time for entry of the Institution Decision. *Id.*, 6. Expert discovery will be complete by October 18, 2024. *Id.*, 7. All dispositive motions will be filed by November 18, 2024. *Id.*, 7. Although no trial date is set yet, the trial is expected to be completed nearly two months before a final written decision. *Id.*, 8; EX2012, 35.

Claims 1-7 of the '052 patent are currently asserted in co-pending litigation between Patent Owner and Petitioner Samsung in Federal District Court in the parallel Samsung litigation. EX2027, 15-20. The case was initiated on December 19,

2022. *Id.*, 103. Infringement contentions were served May 16, 2023; Invalidity contentions were served July 7, 2023; Markman briefing has been complete with the Markman hearing is scheduled April 9, 2024, less than two weeks after the deadline for filing this preliminary response. EX2028, 3. Expert discovery will be nearly complete by the time for entry of the Institution Decision. *Id.*, 3. Additionally, dispositive motions will be fully briefed by August 5, 2024. *Id.*, 1.

Petitioners concede trial is scheduled for October 28, 2024 for the Samsung Litigation, which will pre-date the Board's final written decision by nearly eight months. Petition, 78; EX2028, 1; EX2012, 37. Petitioners argue, without any evidence or basis, that the trial date is not set in stone and could easily change. *Id.* Indeed, the federal trial statistics for the Eastern District of Texas confirm that the time to trial for the Samsung Litigation will pre-date the Board's final written decision by nearly eight months. EX2012, 35. The federal trial statistics for the Western District of Texas confirm that the time to trial for the Qualcomm litigation will pre-date the Board's final written decision by nearly two months. EX2012, 37.

C. The First Factor is Neutral

The first *Fintiv* factor is at least neutral because Petitioners have not requested a stay. *Fintiv II*, Paper 15 at 12 (determining that Factor 1 is neutral when neither party has requested a stay and the issue has not been addressed in the case by the

district court.) Further, Petitioners do not indicate that they would seek a stay if the Petition was instituted. Petition, 77-78.

D. The Second Factor Favors Denial

In this case, the Board will decide whether to institute an IPR on or before June 27, 2024 and its final written decision will be due around June 27, 2025. 35 U.S.C. § 314(b). However, trial of the Samsung Litigation will be complete around November 4, 2024, more than seven months in advance of a final written decision. EX2028, 1. Trial of the Qualcomm Litigation will also be complete months before a final written decision according to the current scheduling. EX2039, 8. Further, the median time to trial in the Eastern District of Texas for similar cases is 21.4 months. EX2012, 35. The median time to trial in the Western District of Texas for similar cases is 28.3 months. EX2012, 37. This timeline is consistent with the governing Scheduling Order. There is no reason for the Board to hold proceedings that would duplicate those in the district court and that would take longer to complete. The Board's scarce resources should be deployed instead where they can increase efficiency and provide the faster alternative proceeding contemplated by the AIA.

The Board's precedential decision in *NHK Spring* recognized that the Board can and should deny institution in its discretion under Section 314(a) when, as here, earlier completion of parallel district court litigation of the same issues would moot

the “objective of the AIA . . . to provide an effective and efficient alternative to district court litigation.”” *See, e.g., NHK Spring Co., Ltd. v. Intri-Plex Technologies, Inc.*, IPR2018-00752, Paper 8, slip op. at 20 (PTAB Sept. 12, 2018) (Precedential) (quotations omitted).

In *NHK Spring*, the Board denied institution in part because of the duplicative nature and the advanced stage of a parallel district court proceeding. IPR2018-00752, Paper 8 at 19-20 (explaining that “the advanced state of [a] district court proceeding is an additional factor that weighs in favor of denying the Petition under §314(a).”). The *NHK Spring* petitioner had “assert[ed] the same prior art and arguments” in a parallel district court proceeding, which was “nearing its final stages” and was scheduled to complete a jury trial about five to six months before a final written decision from the Board would have been due. *Id.* The district court and the Board were also applying the same claim construction standard. *Id.*, 6-7. The Board explained that “instituting a trial under the facts and circumstances . . . would be an inefficient use of Board resources,” and would not be consistent with “an objective of the AIA ...to provide an effective and efficient alternative to district court litigation.” *Id.*, 20.

Additionally, in *E-One, Inc. v. Oshkosh Corp.*, IPR2019-00161, Paper 16 (PTAB May 15, 2019), the Board observed the same factual circumstances as were present in *NHK Spring*, and denied institution. *Id.*, 4, 6-9. The Board looked at

whether “a district court proceeding involving the same patent was scheduled to go to trial before a final decision would have been due in the Board proceeding, and the Board proceeding would involve the same claim construction standard, the same prior art references, and the same arguments as in the district court.” *Id.*, 6.

Just as in *NHK Spring* and *E-One*, the parallel district court proceeding here (i) is between the same parties, (ii) will apply the same claim construction standard, (iii) is currently considering the same or significantly overlapping claim construction issues and invalidity challenges, and (iv) will likely go to trial in months before the Board's statutory deadline.

Under these facts and circumstances, which were also present and were dispositive in *NHK Spring* and *E-One*, institution of a duplicative parallel (and trailing) *inter partes* review proceeding would be an inefficient and wasteful use of the Board's limited resources. As in those cases, the Board should deny institution in its discretion under Section 314(a). This will allow the identical art and arguments to continue to be litigated and determined in district court, where substantial resources have already been expended and the district court stands ready to decide the issues urged here. Institution of an *inter partes* review here cannot provide the “effective and efficient alternative to district court litigation” contemplated by the AIA. *NHK Spring*, IPR2018-00752, Paper 8 at 20.

E. The Third Factor Favors Denial

The third factor concerns “the amount and type of work already completed in the parallel litigation by the court and the parties and the time of the institution decision.” *Fintiv*, Paper 11 at 9. The focus of this factor is on “the actual investment by the district court and the parties” “at the time [the PTAB] decide[s] whether to institute this proceeding.” *Dolby Labs., Inc. v. Intertrust Techs. Corp.*, IPR2020-01106, Paper 12 at 14 (PTAB Jan. 5, 2021). Petitioners address only the work performed as of the filing of the Petition. Petitioners do not address the investment by the District Court and the parties by the time the Board issues its institution decision. As discussed above, a significant investment into the district court proceedings has already taken place. *Supra*, §VII.B.

The third *Fintiv* factor also considers the Petitioner's diligence: if “the petitioner did not file the petition expeditiously, such as at or around the same time that the patent owner responds to the petitioner's invalidity contentions, or even if the petitioner cannot explain the delay in filing its petition, these facts have favored denial.” *Fintiv*, Paper 11 at 11-12. Petitioners do not explain why they waited one year after the Samsung Litigation and Qualcomm Litigation were initiated to file the Petition. Petition, 77-79; *Cisco Sys., Inc. v. Estech Sys., Inc.*, IPR2021-00329, Paper 13 at 11 (PTAB July 6, 2021) (8-month delay between complaint and IPR petition favored denial). Nor do Petitioners explain why they waited more than 5 months

after serving initial invalidity contentions in the Samsung Litigation and 3 months after serving initial invalidity contentions in the Qualcomm Litigation to file the Petition. *Id.*

The Court is expected to issue its claim construction order imminently in the Qualcomm Litigation. EX2039, 6. The Court has scheduled its *Markman* hearing in the Samsung Litigation for April 9, 2024, which is prior to the Board's deadline for issuing the institution decision. EX2028, 3. There will thus be significant investment in the parallel proceedings by the Court and the parties before the institution decision deadline.

Further, the Scheduling Orders demonstrate that trial of the Samsung Litigation will be eight months and the trial of the Qualcomm Litigation will be at least two months in advance of the final written decision statutory deadline. EX2028, 1. EX2039, 8. An enormous amount of resources will have been invested in the parallel litigations before the Board issues a final written decision.

Thus, this factor favors denial.

F. The Fourth Factor Should Favor Denial or Only Marginally Favors Institution

The “concerns of inefficiency and the possibility of conflicting decisions [are] particularly strong” where a petition “includes the same or substantially the same claims, grounds, arguments, and evidence as presented in the parallel proceeding.” *Fintiv* at 12. Here, the Petition includes substantially the same claims, arguments,

and evidence as has been presented in the district court litigations. Claims 1-7 of the '052 Patent have been asserted in the Samsung Litigation. EX2027, 15-20. Claim 6 of the '052 Patent has been asserted in the Qualcomm Litigation. EX2038, 24-30. Each of claims 1-7 has been raised in the Petition. Petition, 3-4. Petitioner Samsung's initial invalidity contentions allege invalidity on the basis of at least Weber which is also relied on in this petition. EX2050, 37-38. Petitioner Qualcomm's initial invalidity contentions allege invalidity on the basis of at least Weber and Rădulescu2004, which are also relied on as the main references in this petition for all the grounds. EX2051, 53-55. In fact, Petitioner submitted claim charts for those references in its district court invalidity contentions. EX2055; EX2056; EX2057. Substantially the same art and arguments were raised and are being litigated in the district court. This weighs in favor of denying the Petition.

Although Petitioners purport to stipulate that it will not pursue the specific grounds raised in the Petition or could have been reasonably raised if Institution is granted, Petitioners have not filed the stipulation or otherwise formalized the stipulation. Petition, 77. Further, in the Samsung Litigation, opening expert reports are due June 3, 2024, prior to the deadline for the Board's Institution Decision, and rebuttal expert reports are due July 1, 2024, days after that deadline. EX2028, 3. Similarly, in the Qualcomm Litigation, all fact discovery will be complete by July 11, 2024, and opening expert reports are due August 9, 2024, weeks after the Board's

Institution Decision. EX2039, 6-7. That is, the parties will have expended significant resources in District Court Litigations on these substantially similar invalidity arguments before the stipulation becomes effective. This reduces the benefit of the so-called *Sotera* stipulation and increases inefficiency.

G. The Fifth Factor Favors Denial

Both Petitioners and Patent Owner are parties to the parallel district court litigations, which further weighs against institution. *Fintiv*, Paper 11 at 13-14.

H. The Sixth Factor Favors Denial

Fintiv factors 1-5 are neutral or favor discretionary denial. Many of the issues in the Petition (or substantially the same issues) will be decided in the district court litigations and these issues will likely be decided prior to the time a final written decision would be rendered. Petitioners have not demonstrated a substantial likelihood of success as to any challenged claim and has not met its statutory burden for institution. Petitioners have therefore not presented compelling evidence of unpatentability. The Petition should therefore be discretionarily denied. *CommScope*, IPR2022-01242, Paper No. 23, at 4-5. In these circumstances, efficiency and the integrity of the system are best served by denying institution. *Fintiv*, Paper 11 at 6.

VIII. THE BOARD SHOULD DENY INSTITUTION PURSUANT TO 35 U.S.C. 314(d)

Under 35 U.S.C. § 325(d), the Board uses a two-part framework to consider when to exercise its discretion and deny institution. *Advanced Bionics, LLC v. MEDEL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020) (precedential). First, the Board considers “whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office.” *Id.* When either condition of the first part of the framework is satisfied, the Board next considers “whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims.” *Id.*

In applying the two-part framework, the Board evaluates six factors (referred to herein as “the Becton factors”):

(a) the similarities and material differences between the asserted art and the prior art involved during examination; (b) the cumulative nature of the asserted art and the prior art evaluated during examination; (c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection; (d) the extent of the overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art or Patent Owner distinguishes the prior art; (e) whether Petitioner has pointed out sufficiently how the Examiner erred in its evaluation of the asserted prior art; and (f) the extent to which additional evidence and facts presented in the Petition warrant reconsideration of prior art or arguments.

Id. at 8-10 (citing *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 (PTAB Dec. 15, 2017) (precedential as to § II.C.5, first paragraph)) (“*Becton*”); *see also* Trial Practice Guide July 2019 Update, 28-31, Fed. Reg. 33,925 (July 16, 2019). Factors (a), (b), and (d) provide guidance on how to apply the first step, i.e., whether the art or arguments presented in the petition are the “same or substantially the same” as the art or arguments previously presented to the Office. *Id.* at 10. Factors (c), (e), and (f) then aid the Board in determining whether the petitioner has demonstrated a material error by the Office. *Id.*

This framework “reflects a commitment to defer to previous Office evaluations of the evidence of record unless material error is shown.” *Id.* at 8. Here, all six factors weigh in favor of denying institution.

A. *Advanced Bionic Part 1: Substantially the Same Prior Art and Arguments Were Previously Considered by the Office*

As detailed below, Petitioners rely on the same or substantially the same prior art and arguments here as were presented to the Office during the prosecution of the patents. Accordingly, *Becton* factors (a), (b), and (d) weigh in favor of denying institution.

Rădulescu2004 is substantially similar to the references cited by the examiner and overcome by the applicant in the prosecution history: “Concepts and Implementation of the Philips Network-on-Chip” by Dielissen et al. (“Dielissen”)

and “Communication Services for Networks on Chip” by Rădulescu et al. (“Rădulescu2000”). EX1002, 79.

1. Rădulescu2000 and Dielissen Have Been Fully Considered by the Office

There is no dispute that both Rădulescu2000 and Dielissen were fully considered by the Office during prosecution, especially in the office actions of the '052 patent. *See* Petition, 14, 8-9.

2. Rădulescu2004 is Cumulative of or Substantially Similar to Rădulescu2000 and Dielissen

Grounds 1, 2, and 4 rely on Rădulescu2004 as the primary reference. While Rădulescu2004 itself was not directly before the Examiner during prosecution, as explained below Rădulescu2004 is applied to the claims of the '052 patent in a manner entirely cumulative to or substantially similar to the manner in which Rădulescu2000 and Dielissen were applied both during prosecution and in this proceeding. Therefore, Rădulescu2004 does not present any issues that the Office has not already substantially considered.¹ *Nora Lighting, Inc. v. Juno Mfg., LLC*, IPR2015-00601, Paper 13 at 10-11 (PTAB Aug. 12, 2015) (denying institution where “although the references are not the same as those submitted for ex parte reexamination, the nature of the evidence as to the prior art at the time of the

¹ Patent Owner does not agree with the Examiner's characterizations of the prior art for at least the reasons articulated during prosecution.

invention and the arguments presented are substantially the same as that which already has been presented to the Office...”).

Petitioners erroneously state: “Rădulescu2004 contains additional details not disclosed in Dielissen or Rădulescu2000, including regarding mapping to a connection according to an address range.” Petition, 15. Petitioners then state: “Figure 1 of Rădulescu2004 is essentially identical to Figure 3 of the ’052 patent and shows a network interface.” *Id.* However, Petitioners ignore that Figure 1 of Rădulescu2004 is nearly identical to Figure 7 of Dielissen:

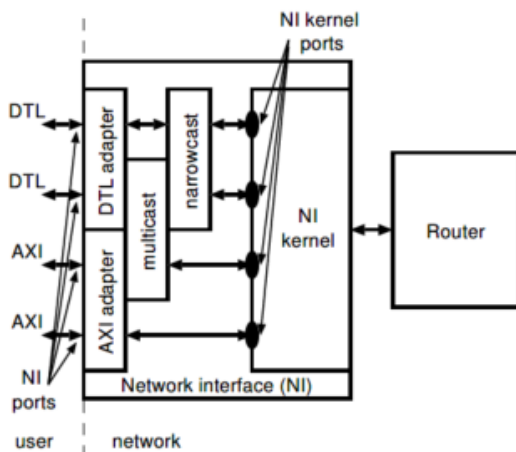


Figure 1. NI kernel and shells

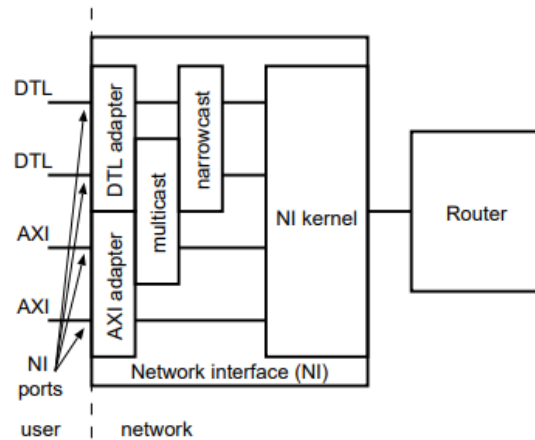


Figure 7. NI kernel and shells

EX1005, 3; EX1011, 4.

Petitioners also allege that “Rădulescu2004 contains additional disclosure” including “explaining how using the connid signals, mapping to connections can be based on an address range.” Petition, 16-17. However, Dielissen discloses a “connid” and teaches [a] port can have multiple connection to allow differentiated

traffic classes (e.g., best effort, or guaranteed throughput), in which case there are also *connid* signals to select on which connection a message is supplied or consumed. EX1011, 3. Dielissen also illustrates use of the *connid* by the network interface in Figure 6. EX1011, 4. Dielissen further discloses that the network interface kernel can be used for narrowcast connections. *Id.* Rădulescu2000 similarly discloses narrowcast connections where a network interface performs mapping based “on an address space.” EX1010, 16-17.

Petitioners failed to show that Rădulescu2004 is more probative to the obviousness inquiry than either Dielissen or Rădulescu2000, each of which was extensively considered by the Office. In fact, Petitioner does not identify any specific material differences in the manner in which the teachings of Rădulescu2004 are applied, on the one hand, and the manner in which the teachings of Dielissen and Rădulescu2000 were applied, on the other hand. The fact that Rădulescu2004 is applied in a cumulative or substantially the same manner is proven by the fact that Petitioners rely on Rădulescu2004 for disclosing all the same elements of the independent claims as Dielissen and Rădulescu2000. Petition, 20-32.

In addition, like Rădulescu2004, Dielissen and Rădulescu2000 disclose a fixed hardware configuration between modules and network interfaces that is required to be set up prior to receiving service requests during an operational stage, i.e., prior to mapping communication service requests. See EX1002, 141. EX2001,

¶124. For the same reasons provided by the Applicant that overcame these rejections, Rădulescu2004 does not anticipate or render obvious claim 6 of the '052 Patent.

Because the manner and reasons for applying Rădulescu2004 to the challenged claims are the same as those for Dielissen and Rădulescu2000, and because Petitioners failed to explain how Rădulescu2004 is different or more probative of obviousness than either Dielissen or Rădulescu2000, the Board should find that, with respect to Grounds 1, 2, and 4's reliance on Rădulescu2004, "the nature of the evidence as to the prior art at the time of the invention and the arguments presented are substantially the same as that which already has been presented to the Office" *Nora Lighting*, IPR2015-00601, Paper 13 at 10-11.

The Board should, therefore, deny institution because the Petition presents substantially the same prior art and arguments as those already considered by the examiner. See *Unilever, Inc. v. The Procter & Gamble Company*, IPR2014-00506, Paper 17 at 6-7 (PTAB July 7, 2014) (denying institution under § 325(d) where the petition presented six previously considered references and seven new references because the arguments raised are substantially the same as those previously presented to the Office).

B. Advanced Bionic Part 2: Petitioners have Not Demonstrated Material Error

Petitioners have not demonstrated, nor even attempted to demonstrate, that the Office erred in a manner material to the patentability of the challenged claims. Accordingly, Becton factors (c), (e), and (f) weigh in favor of denying institution.

C. All of the *Becton* Factors Weigh in Favor of Denying Institution

In view of the above, Petitioners' cited art and arguments in at least Ground 1 have already been substantially considered by the Office, and the Board should decline to reconsider those arguments under § 325(d). See *R.J. Reynolds Vapor Co. v. Fontem Holdings I B.V.*, IPR2017-01642, Paper 10 at 15-16 (PTAB Jan. 16, 2018) (“[W]e are not persuaded that adjudicating a dispute on already-considered issues is an efficient use of Board or party resources.”) (citations omitted).

IX. PETITIONERS HAVE NOT ESTABLISHED ANY CLAIM IS UNPATENTABLE

For the reasons set forth below, the Board should deny institution because Petitioners have not met their burden of showing that any claim of the '052 Patent is unpatentable.

A. Ground 1: Purported Anticipation by Rădulescu2004 (Claims 1-2 and 5-7)

In Ground 1, Petitioners allege that claims 1-2 and 5-7 are anticipated by Rădulescu2004. See Petition, 20-32.

1. Rădulescu2004 Fails to Anticipate Claim 6

Claim 6 of the '052 Patent recites a method of **communication service mapping** in an integrated circuit where a first module requests a communication service to a second module based on a communication service identification, where a communication service identification includes a communication thread or an address range identifying a second processing module of a memory region therein. EX2001, ¶120. The specification explains that “communication threads are used to identify traffic classes of a communication,” such as “a fast traffic class [and] a slow traffic class.” EX1001, 7:44–54. Claim 6 also recites “**mapping the requested at least one communication service** based on said specific communication properties **to a connection** based on a set of connection properties according to said at least one communication service identification.” EX1001, 10:7–32 (emphasis added). EX2001, ¶120.

- a. **Rădulescu2004 Does Not Anticipate “communication service mapping” or “mapping the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties according to said at least one communication service identification.”**

Rădulescu2004 discloses a network interface for an on-chip network referred to as the *Æthereal NoC*. EX2001, ¶121. EX1005, Abstract; *see also* EX1005, 2 (“The *Æthereal NoC* offers its services on connections.”). These connections identify communications with different properties.

Connections are composed of unidirectional point-to-point channels (between a single master and a single slave). To each channel, properties are attached, such as guaranteed message delivery or not, in order or un-ordered message delivery, and with or without timing guarantees. As a result, different properties can be attached to the request and response parts of a connection, or for different slaves within the same connection.

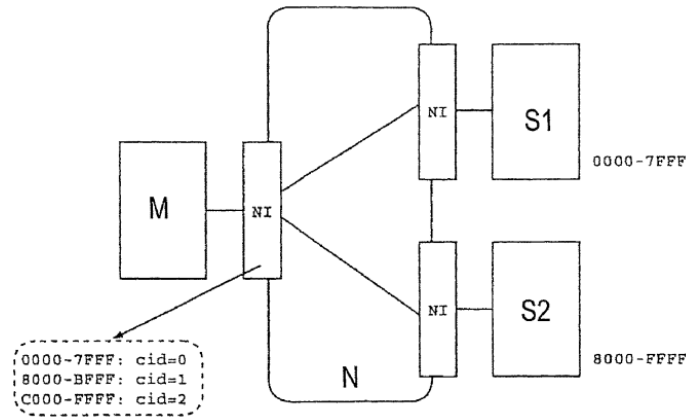
EX1005, 2.

Contrary to the Petition, Rădulescu2004 does not disclose a communication service mapping as recited in claim 6 of the '052 Patent. EX2001, ¶123. Petition, 21-23. Instead, Rădulescu2004 discloses a fixed hardware configuration between modules and network interfaces that is required to be set up before receiving service requests during an operational stage, i.e., prior to mapping communication service requests. EX2001, ¶123; EX1005, 1 (“Before the *Æ*thereal NoC can be used by an application, it must be configured. NoC (re)configuration means opening and closing connections in the system.”); EX1005, 2 (“Connections are set up depending on the application or the mode the system is running. Therefore, we must be able to open and close connections while the system is running.”). Further, “[c]onnections can be opened and closed at any time. Opening and closing of connections takes time, and **is intended to be performed at a granularity larger than individual transactions.**” EX1005, 2 (emphasis added). “Communication is performed using a transaction-based protocol, where master IP modules issue request messages (e.g., read and write commands at an address, possibly carrying data) that are executed by

the addressed slave modules, which may respond with a response message (i.e., status of the command execution, and possibly data).” EX1005, 1.

In contrast to Rădulescu2004, the claimed invention of the '052 Patent is based on offering differentiated services for protocols such as DTL, MTL, AXI, and OCP. EX2001, ¶125. This is achieved by mapping the identification means of these protocols, which are communication threads or addresses, to connections. *Id.* The threads or addresses are mapped to connections based on specific connection properties through the interconnect. *Id.* This is different from Radulscu2004, which discloses end-to-end flow control and guaranteed throughputs, but is silent regarding offering differentiated services for protocols such as DTL, MTL, AXI, and OCP, by mapping the identification means of these protocols to connections. *Id.*

The specification and figures of the '052 Patent further highlight the distinction between the creation of desired properties *prior to their use*, as taught in Rădulescu2004, and the claimed invention. EX2001, ¶126. FIG. 4 of the '052 Patent (reproduced below) is a block diagram illustrating the operation of mapping (i.e., communication service mapping) of IP block communication via address ranges to connections. EX2001, ¶127.



EX1001, FIG. 4

The description of FIG. 4 of the '052 Patent states:

[T]he network interface NI associated to the master M may map the communication to the first slave S1, i.e. to the address range 0000-7FFF, to a connection with the connection id cid=0 and the communication to the second slave S2, i.e. to the address range 8000-FFFF, to a connection with the connection id cid=1.

Hence, **protocols where there are no communication threads (e.g., DTL, MTL), address ranges can be mapped to specific connections. An address range can identify one or more slave modules**, or a memory region within a slave module, e.g. a buffer used in some particular communication.

EX1001, 8:7–26 (emphasis added).

In contrast, Rădulescu2004 only describes a network interface (NI) for providing conversion of the packet-based communication of the network to the higher-level protocol that the IP modules use. EX2001, ¶128; EX1005, 1 (“Our NI provides services at the transport layer in the ISO-OSI reference model [22], because this is the first layer where offered services are independent of the network implementation. . . . We provide transport-layer services by defining connections.”

(brackets in original)); *see also* EX1005, 2 (“Packetization is performed by the NI, and is thus transparent to the IP modules.”). Specifically, Rădulescu2004 explains that the network interface has two parts:

The network interface (NI) ... in two parts (see Figure 1): (a) the NI kernel, which implements the channels, packetizes messages and schedules them to the routers, implements the end-to-end flow control, and the clock domain crossing, and (b) the NI shells, which implement the connections (e.g., narrowcast, multicast), transaction ordering for connections, and other higher-level issues specific to the protocol offered to the IP.

EX1005, 3.

For more complex types of connections, such as narrowcast or multicast, and to provide conversions to other protocols, we add shells around the NI kernel. ... Note that these shells add specific functionality, and can be plugged in or left out at design time according to the requirements.

EX1005, 4.

Therefore, Rădulescu2004 discloses the creation of desired properties *prior to their use*, which is different from the communication service mapping recited in claim 6. EX2001, ¶130. For at least these reasons, Rădulescu2004 does not anticipate or render obvious the “communication service mapping” or the “mapping the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties according to said at least one communication service identification” as recited by claim 6.

- b. Rădulescu2004 Does Not Anticipate “at least one communication service . . . based on specific communication properties . . . wherein said at least one communication service identification comprises at least one communication thread or at least one address range, said address range for identifying one or more second processing modules (S) or a memory region within said one or more second processing modules (S)”**

Petitioners' theory based on the “at least one address range” option of the communication service identification recited in claim 6 of the '052 Patent also fails. Petition, 24. Rădulescu2004 does not disclose or render obvious “communication service identification compris[ing] . . . at least one address range, said address range for identifying one or more second processing modules (S) or a memory region within said one or more second processing modules (S).” EX2001, ¶131.

First, a POSITA understands that a range has a lower bound and an upper bound. EX2001, ¶132. Petitioners conflate two separate concepts in Radalescu2004: (1) that a request for a transaction can include an address (EX1005, §1, 2 §2, 4 §4.2, FIG. 5); and (2) that a slave can be assigned an address range. (EX1005, 4 §4.2). Petition, 24 (“Within a narrowcast connection, the slave for which the transaction is destined is selected based on the address (Conn block). The address range assigned to a slave is configurable in the narrowcast module.”) EX2001, ¶132. These mistakenly merged two distinct concepts, do not disclose or suggest “communication service identification compris[ing] . . . at least one address range,

said address range for identifying one or more second processing modules (S) or a memory region within said one or more second processing modules (S).” *Id.*

Second, as discussed above, Rădulescu2004 does not disclose a communication service mapping as recited in claim 6 of the '052 Patent, but discloses a fixed hardware configuration between modules and network interfaces that is *required to be set up prior to receiving service requests* during an operational stage, i.e., prior to mapping communication service requests. See EX1005, 1. EX2001, ¶133. Thus, transaction requests in Radalescu2004 and any addresses associated therewith come *after* the configuration between modules and network interfaces has already been set up. *Id.* Therefore, the address associated with a transaction request in Radalescu2004 cannot be the “address range” of a communication service identification on which the communication service is based as required in claim 6 of the '052 Patent. *Id.*

For at least the above reasons, Rădulescu2004 does not anticipate “at least one communication service . . . based on specific communication properties . . . wherein said at least one communication service identification comprises at least one communication thread or at least one address range, said address range for identifying one or more second processing modules (S) or a memory region within said one or more second processing modules (S)” as recited in claim 6.

2. Rădulescu2004 Fails to Anticipate Claims 1 and 7

Petitioners allege that Rădulescu2004 at least discloses “mapping the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties according to said at least one communication service identification” for the same reasons as claim 6. See Petition, 32-26. Thus, Rădulescu2004 fails to anticipate Claims 1 and 7 for at least the same reasons as Claim 6. EX2001, ¶135-136.

3. Rădulescu2004 Fails to Anticipate the Dependent Claims

The dependent claims are not anticipated by Rădulescu2004 for at least the same reasons that the independent claims from which they depend are not anticipated by Rădulescu2004.

B. Ground 2: Purported Obviousness over Rădulescu2004 in view of OCP (Claims 1-7)

In Ground 2, Petitioners allege that claims 1-7 are rendered obvious by Rădulescu2004 in view of OCP. *See* Petition, 36-47. Petitioners allege that “a POSA would have been motivated to implement the OCP protocol in the system of Rădulescu2004, including its threads and address range teachings, as the Rădulescu2004 expressly identifies OCP as one of the existing protocols with which its NOC is compatible.” Petition, 42. OCP does not cure the fundamental deficiency that Rădulescu2004 does not disclose a communication service mapping because it discloses a fixed hardware configuration between modules and network interfaces

that is *required to be set up prior to receiving service requests* during an operational stage. EX2001, ¶139-145. For at least the same reasons as set forth in relation to Ground 1, Rădulescu2004 in view of OCP fails to anticipate or render obvious Claims 1, 6, and 7 in Ground 2 or the dependent claims that depend therefrom. *Id.*

C. Ground 3: Purported Anticipation by Weber (Claims 1-7)

In Ground 3, Petitioners allege that claims 1-7 are anticipated by Weber. *See* Petition, 47-67.

1. Weber Fails to Anticipate Claim 6

a. Weber Does Not Anticipate “at least one communication service identification comprises at least one communication thread or at least one address range, said address range for identifying one or more second processing modules”

(i) Weber Does Not Anticipate “. . . at least one communication thread”

Weber's disclosure focuses on a communication system that utilizes a bus to transport signals, including thread identifiers (Thread IDs) which denote parts of a data transfer stream. EX2001, ¶151; EX1007, FIG. 11.

Petitioners erroneously mapped the ThreadID associated with a request [from a master] of Weber with the “at least one communication service identification comprises at least one communication thread” recited in claim 6 of the '052 Patent. Petition, 52-53, 62-64. EX2001, ¶152. The '052 Patent discloses that the communication service identification is “used to identify traffic classes of a

communication,” such as “a fast traffic class [and] a slow traffic class.” EX1001, 7:44–54 (emphasis added); EX2001, ¶152. In contrast, Weber discloses that a thread identifier, e.g., a Thread ID or a ReqThreadID, **identifies a transfer**, e.g., a transaction. EX1007, ¶[0123] (“thread identifier is an identifier of local scope that simply identifies transfers between the interface module and its connected functional block, . . .”); EX1007, Abstract (“The plurality of signals includes a thread identifier that indicates a transaction stream that the data transfer is part of . . .”); EX1007, ¶[0125] (“using a networking analogy, the Thread ID is a level-2 (data link layer) concept, whereas the CONNID is more like a level-3 (transport/session layer) concept.”). As noted in the Petition, the thread identifier, ReqThreadID, “is a four-bit signal that **provides the thread number associated with a current transaction** intended for slave 1104.” EX1007, ¶[0085] (emphasis added); Petition, 52. “A POSITA would understand a ‘thread number’ as used in Weber is a unique identifier of the transaction, not a traffic class.” EX2001, ¶152.

Therefore, Weber does not anticipate “at least one communication service identification comprises at least one communication thread” as required by claim 6 of the ’052 Patent.

- (ii) **Weber Does Not Anticipate “. . . at least one address range, said address range for identifying one or more second processing modules”**

The Petition speculatively alleges that “the address signal that is sent by the interface modules indicates an address range, such that the request is based on an address range.” Petition, 54. The Petition relies on paragraph 193 of Dr. Hassoun’s Declaration. Petition, 53-54. However, paragraph 193 of Dr. Hassoun’s declaration merely opines that Weber discloses the “*capability* of issuing a request based on an address range.” EX1003, ¶ 193 (emphasis added). Petitioner has failed to meet the high standard to demonstrate inherency. *See, e.g., Hansgirk v. Kemmer*, 102 F.2d 212, 214 (C.C.P.A. 1939) (“[i]nherency . . . may not be established by probabilities or possibilities”); *Roland Corp. v. inMusic Brands, Inc.*, IPR2018-00335, 2018 WL 3244506, at *7 (PTAB July 2, 2018) (“Petitioner's argument that these features are inherent is insufficient absent persuasive evidence or argument that such features are necessarily present”).

Further, the sections of Weber cited by Dr. Hassoun do not support his opinion that Weber discloses the “address range” limitation. EX2001, ¶155-156. A POSITA would, however, understand that a range has a lower bound and an upper bound. EX2001, ¶160. But nothing in Weber suggests that the client address base stored in the status register includes, indicates, or suggests a lower bound and an upper bound. *Id.*

In Weber, the “Addr” signals indicates “a particular resource that an initiator functional block wishes to access.” EX1007, ¶[0080]; EX2001, ¶154. Weber also

discloses that the client address base determines a state of the initiator module. EX1007, ¶[0045]. Weber does not disclose or suggest that an external address portion of the ADDRE0 address refers to the client address base. EX2001, ¶162. In addition, the disclosure from Weber that “a single target is selected to receive the write data by decoding an external address portion of” the address signal has nothing to do with “address range.” Petition 54 (citing EX1007, ¶[0056]); EX2001, ¶161.

The Petition cites paragraph [0052] of Weber to support its theory that Weber discloses this limitation. Petition, 53. Paragraph [0052] of Weber states:

Supported transfer types in this embodiment include, but are not limited to read and write transfers. Address lines 228 carry a multi-bit signal driven by an initiator bus owner **to specify the address of the object to be read or written** during the current transfer.”).

EX1007, ¶[0052]. However, Weber describes “possible status indications of a current transfer where the first indication indicates that *the address signal does not select a target*”:

Response lines 232 carry a multi-bit signal driven by a target to indicate the status of the current transfer. Supported responses include, but are not limited to the following responses. **A NULL response indicates that the current transfer is to be aborted, presumably because the address does not select any target.**

EX1007, ¶[0052] (emphasis added); EX2001, ¶167. Moreover, Weber states: a “[t]arget interface module 900 includes . . . state registers in state control block 916 [that] include registers that store, for example, client address base and an identifier for target functional block 918.” EX1007, ¶[0046]. A POSITA understand that, in

Weber, the identifier for the target functional block disclosed by Weber is “neither the address signal sent by an initiator nor the client address base stored in the state register of an interface.” EX2001, ¶167.

For at least these reasons, Weber does not anticipate the “communication service identification comprises . . . at least one address range, said address range for identifying one or more second processing modules” as required by claim 6 of the '052 Patent.

b. Weber Does Not Anticipate “coupling said plurality of processing modules (M, S) by an interconnect means (N)”

Contrary to Petitioner's allegation, Weber does not anticipate at least “an interconnect means.” EX2001, ¶168. As discussed above “interconnect means” should be construed to mean “multi-hop interconnection between modules separated by one or more network nodes.” *Supra*, § VI.A.1.

Petitioners' contention that the system shown in FIG. 1 of Weber (reproduced below and annotated in red) discloses a multi-hop interconnection between modules separated by one or more network nodes because the system can include a bridge “block ‘F’ between bus 114 and bus 112 is flawed. EX2001, ¶169.

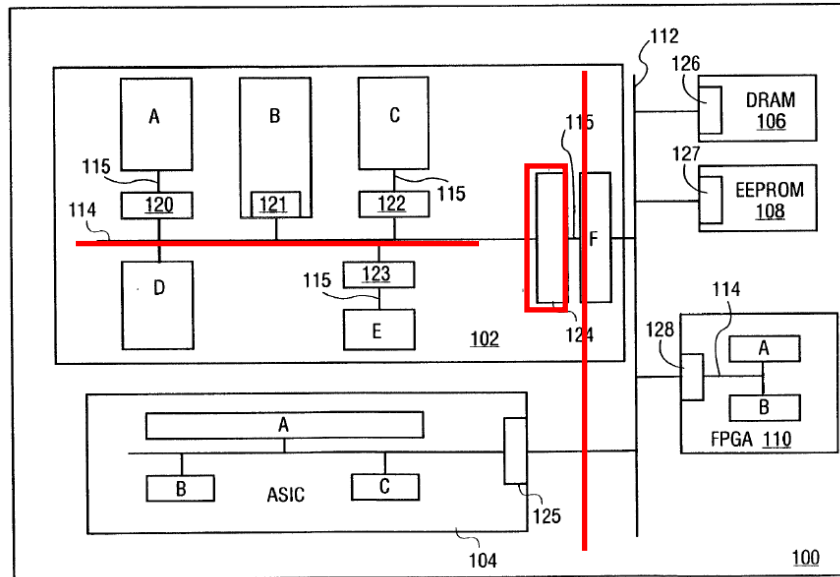


FIG. 1

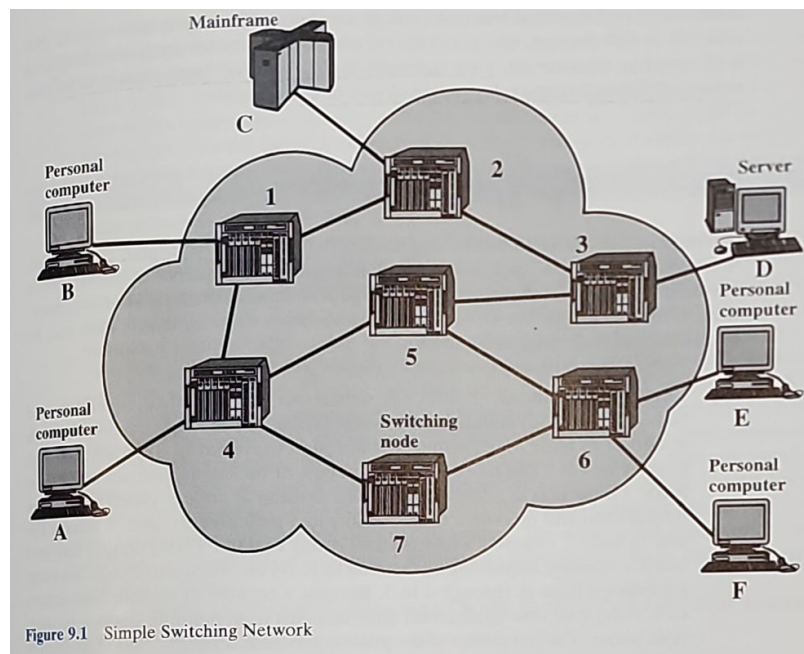
EX1007, FIG. 1

In FIG. 1, Weber identifies module 124 as an interface module and functional blocks by capital letters. EX1007, ¶[0040]; EX2001, ¶170. Weber explains that “there are four fundamental types of functional blocks. . . . initiator, target, **bridge**, and snooping blocks.” EX1007, ¶[0040]. Weber does not provide an example of a bridge or a snooping block. EX2001, ¶170. A POSITA would understand that each “hop” in a network corresponds to a network node, e.g., a switch or a router, that selectively routes data or messages, such that a “hop count” is the quantity of network nodes that a message encounters from initiator to target. EX2001, ¶173; *see, e.g.*, EX2005 (“Dally”) at 3 (“At each hop, the packet moves from one link to another”); *id.* at 4 (“[F]olded torus topology trades a longer average flit transmission distance for fewer routing hops.”). “A POSITA would understand that [a] bridge is a simple device that connects two (or more) interconnects by repeating messages

that it observes on a first interconnect to a second interconnect, and vice versa.”

EX2001, ¶170; *see, e.g.*, EX2010. In contrast, “a switch or a router is a network node that switches data or messages, i.e., it selectively routes data or messages.” EX2001, ¶170 (citing EX2010, 277, Fig. 9.1).

Data entering the network from a station are routed to the destination by being switched from node to node. . . . Some nodes connect only to other nodes Their sole task is the internal (to the network) switching of data. Other nodes have one or more stations attached as well; in addition to their switching functions, such nodes accept data from and deliver data to the attached stations.

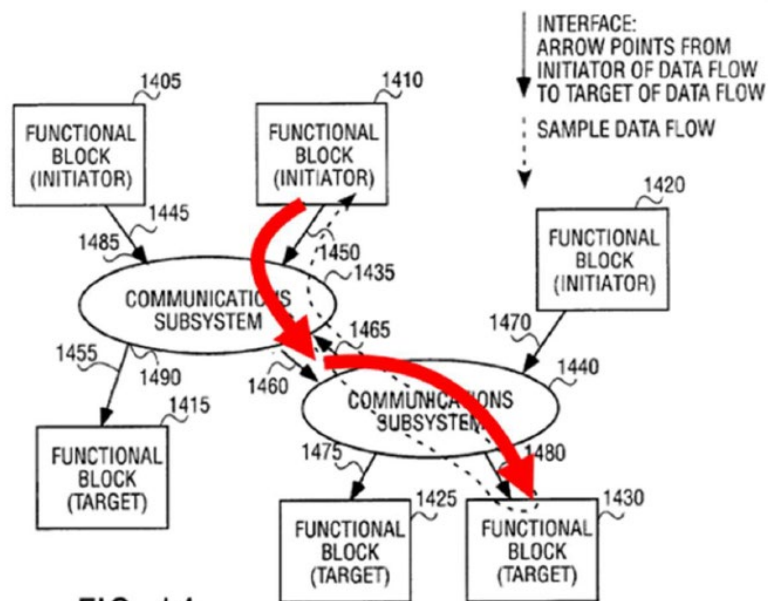


EX2010, Fig. 9.1

A POSITA would understand that two buses being connected by a bridge as disclosed in Weber does not disclose or suggest a multi-hop interconnection between modules separated by one or more network nodes. EX2001, ¶171. For at least this

reason, Weber does not anticipate “coupling said plurality of processing modules (M, S) by an interconnect means (N),” as required by claim 6. *Id.*

Petitioners also allege that the system shown in FIG. 14 of Weber (reproduced below as annotated in the Petition) discloses the “interconnect means” because the data flow highlighted in red travels two interfaces. Petition, 57-58. However, as discussed above, “the communication subsystems in Weber are not network nodes and they do not cause data messages of a data flow to incur hops.” EX2001, ¶172.



The communication subsystems in Weber also do not selectively route data or messages like switches or routers, and they therefore do not correspond to hops. EX2001, ¶173.

FIG. 17 of Weber (reproduced below and annotated in red) shows a step 1715 of “a mapping of the data flow through the channels of the system is first

determined.” EX1007, [0104]. EX2001, ¶174. FIG. 18 of Weber (reproduced below and annotated in red) discloses an “exemplary mapping process.” EX1007, [0107]; EX2001, ¶174.

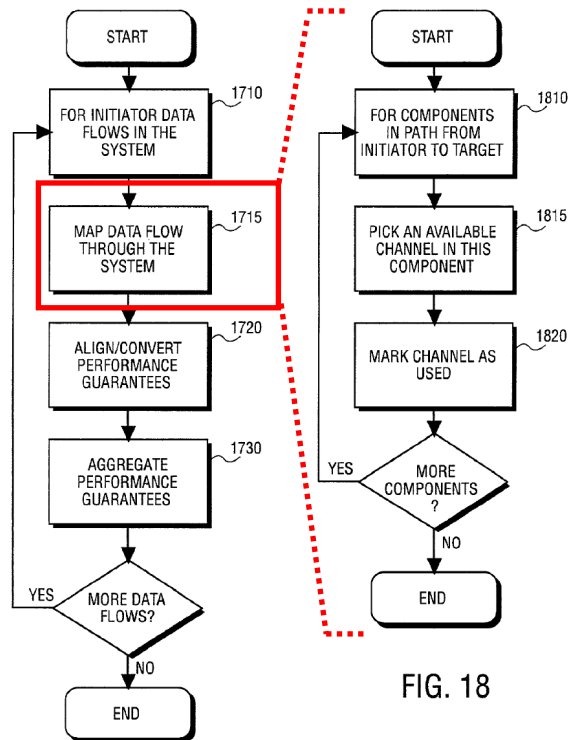


FIG. 18

FIG. 17

Weber only discloses that, during the mapping process, “[f]or each component in a path from initiator to target, e.g., through several interfaces and one or more communication subsystems step 1710, an available channel **is chosen** . . . [and] **one could choose** the channel that most closely matches the performance requirements of the initiator’s data flow.” EX1007, ¶[0107] (emphasis added). “Weber does not disclose or suggest that an available channel is chosen *by a communication*

subsystem or that *a communication subsystem* could choose the channel.” EX2001, ¶175.

Weber provides various system configurations with mappings, yet it does not attribute the channel-choosing to communication subsystems. In one scenario, mappings are preloaded, excluding these subsystems from channel-choosing. EX1007, ¶[0111]; EX2001, ¶176. Another instance suggests self-reconfiguration without specifying the components involved. EX1007, ¶[0112]; EX2001, ¶176. Additionally, Weber mentions an initial operation with an unsatisfactory mapping, leading to a reconfiguration for improved performance, again without indicating communication subsystems' involvement in channel-choosing. EX1007, [0113]; EX2001, ¶176.

Indeed, Weber discloses the data flow mapping process as a “global mechanism,” further indicating that the channel-choosing is not a local process within a communication subsystem. EX1007, ¶[0107] (“FIG. 18 focuses in on one embodiment of the data flow mapping process that is part of the global mechanism shown in FIG. 17.”) EX2001, ¶177.

In summary, “the communication subsystems of the system of FIG. 14 of Weber do not perform the channel-choosing step of the mapping process, e.g., they do not switch data or messages, so they are not network nodes and they do not correspond to hops in a multi-hop interconnection.” EX2001, ¶178.

Weber, therefore, does not anticipate or render obvious “coupling said plurality of processing modules (M, S) by an interconnect means (N)” as required by claim 6.

c. Weber Does Not Anticipate “controlling the communication between said at least one first of said plurality of processing modules (M) and said interconnect means (N) by at least one network interface (NI) associated to said at least one first of said processing modules”

At least because Weber does not anticipate the “interconnect means,” Weber does not anticipate or render obvious “controlling the communication between said at least one first of said plurality of processing modules (M) and said interconnect means (N) by at least one network interface (NI) associated to said at least one first of said processing modules,” as required by claim 6. EX1001, claim 6 (emphasis added); EX2001, ¶179.

d. Weber Does Not Anticipate “mapping the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties according to said at least one communication service identification”

At least because Weber does not disclose the claimed communication service identification, Weber does not anticipate or render obvious “mapping the requested at least one communication service . . . according to said at least one

communication service identification,” as required by claim 6 (emphasis added).

EX2001, ¶180.

2. Weber Fails to Anticipate Claims 1 and 7

The Petition alleges that Weber discloses limitation “mapping the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties according to said at least one communication service identification” for the same reasons as Claim 6. See Petition, 65-66. Thus, Weber fails to anticipate Claims 1 and 7 for the same reasons as Claim 6. EX2001, ¶181-182.

3. Weber Fails to Anticipate the Dependent Claims

The dependent claims are not anticipated or rendered obvious by Weber for at least the same reasons that the independent claims from which they depend are not anticipated or rendered obvious by Weber.

D. Ground 4: Purported Obviousness over Weber in view of Rădulescu2004 (Claims 1-7)

In Ground 4, Petitioners allege that claims 1-7 are rendered obvious by Weber in view of Rădulescu2004. See Petition, 68-72. However, neither Weber nor Rădulescu2004 cure the deficiencies of Grounds 1 and 3. For the same reasons discussed with respect to Claim 6 in Grounds 1 and 3, Weber in view of Rădulescu2004 fails to render obvious Claims 1, 6, and 7 or the dependent claims in Ground 4. EX2001, ¶185-188.

X. CONCLUSION

For at least the foregoing reasons, the Petition should be denied. The fact that Patent Owner's Preliminary Response has focused on particular arguments does not constitute a concession that there are no other arguments for patentability of the challenged claims.

Respectfully submitted,

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By: /Jennifer Hayes/
Jennifer Hayes
Reg. No. 50,845
Nixon Peabody LLP
300 South Grand Avenue,
Suite 4100,
Los Angeles, CA 90071-3151
Tel. 213-629-6179
Fax 866-781-9391

Lead Counsel for Patent Owner

CERTIFICATION OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), the undersigned hereby certifies that the foregoing Patent Owner's Preliminary Response is produced using a 14-point Times New Roman font and contains approximately 13,998 words, which is less than the 14,000 total words permitted by the U.S. Patent Trial and Appeal Board rules. Counsel relies on the word count of the computer program used to prepare the response on March 27, 2024.

Dated: March 27, 2024

By: /s/ Jennifer Hayes

Lead Counsel for Patent Owner

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing **Patent Owner's Preliminary Response** was served on March 27, 2024, by email:

J. Derek Vandenburg
Aaron W. Pederson
Nathan D. Louwagie
Ryan D. Rypka
Carlson Caspers Vandenburg & Lindquist, P.A.
225 South Sixth Street, Suite 4200
Minneapolis, MN 55402
dvandenburg@carlsoncaspers.com
apederson@carlsoncaspers.com
nlouwagie@carlsoncaspers.com
rrypka@carlsoncaspers.com

F. Christopher Mizzo, P.C.
KIRKLAND & ELLIS LLP
1301 Pennsylvania Ave., N.W.
Washington, D.C. 20004
Sasmung_NST_IPR@kirkland.com

Gregory S. Arovas, P.C.
Alan Rabinowitz
KIRKLAND & ELLIS LLP
601 Lexington Avenue
New York, NY 10022
Samsung_NST_IPR@kirkland.com

Counsel for Petitioners

By: /s/ Jennifer Hayes

Lead Counsel for Patent Owner