

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

QUALCOMM INCORPORATED*
Petitioner

v.

NETWORK SYSTEM TECHNOLOGIES, LLC
Patent Owner

Patent No. 7,373,449

Inter Partes Review No. IPR2024-00338

PATENT OWNER'S RESPONSE

* Qualcomm Incorporated filed a petition and a motion for joinder in IPR2024-01081 and was joined as a petitioner in this proceeding.

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2001	WITHDRAWN
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
2013-2020	RESERVED
2021	Order Resetting Jury Trial, <i>Network System Technologies, LLC v. Texas Instruments Incorporated</i> , Civil Action No. 2:22-cv-00482-

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	RWS (E.D. Tex.), Dkt. 182 (Mar. 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)
2023-2027	RESERVED
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	Samsung's First Amended Answer and Counterclaims, <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. 96 (Jan. 24, 2024) (Public Version)
2030	Samsung's P.R. 4-1 Identification of Proposed Terms and Claim Elements for Construction, <i>Network System Technologies, LLC v. Samsung Electronics Co., Ltd.</i> , Civil Action No. 2:22-cv-00482-RWS (E.D. Tex.) (Nov. 28, 2023)
2031	Samsung's Amended P.R. 4-1 Identification of Proposed Terms and Claim Elements for Construction, <i>Network System Technologies, LLC v. Samsung Electronics Co., Ltd.</i> , Civil Action No. 2:22-cv-00482-RWS (E.D. Tex.) (Dec. 18, 2023)
2032	Samsung's Preliminary Claim Construction and Extrinsic Evidence Pursuant to Local Patent Rule 4-2, <i>Network System Technologies, LLC v. Samsung Electronics Co., Ltd.</i> , Civil Action No. 2:22-cv-00482-RWS (E.D. Tex.) (Dec. 19, 2023)
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)

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2035	Defendant Samsung Electronics Co., Ltd.’s Responsive 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. 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)
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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)
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)

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2072	A survey of Research and Practices of Network on Chip
2073	Routing Algorithms for On Chip Networks
2074	McGraw Hill Dictionary
2075	IEEE Dictionary
2076	Supported Token-Ring Functions – IBM Documentation
2077	Token Ring Solutions
2078	Transcript of Nov. 4, 2024 Deposition of Dr. Todd Mowry
2079	Transcript of Nov. 15, 2024 Deposition of Sean O’Bryan

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2080	Transcript of Sept. 20, 2024 Deposition of Gordon MacPherson
2081	IEEE - Terms & Disclosures for Use of IEEE Websites
2082	IEEE XPlore Metrics (Radulescu)
2083	IEEE Xplore Metrics (Goossens2002)
2084	<i>Markman</i> Hearing Transcript, <i>Network System Technologies, LLC v. Samsung Electronics Co., Ltd.</i> , Civil Action No. 2:22-cv-00481-JRG (E.D. Tex.) (Apr. 9, 2024)
2085	Declaration of Peter Krusiewicz

I. INTRODUCTION

Network System Technologies, LLC (“Patent Owner”) respectfully submits this Response to the Petition (IPR2024-01081, Paper 1) filed by Qualcomm Incorporated (“Qualcomm” or “Petitioner”) challenging claims 2, 6, and 9-16 (“challenged claims”) of U.S. Patent No. 7,373,449 (“the ’449 Patent”).¹ Petitioner has not shown any challenged claim is unpatentable.

II. OVERVIEW OF THE ‘449 PATENT

At the time of the invention, systems-on-chip (“SoC”) “show[ed] a continuous increase in complexity due to the ever increasing need for implementing new features and improvements of existing functions.” EX1001, 1:15-17; EX2070, ¶89.² The inventors recognized that conventional SoCs where modules were interconnected via a bus were no longer practical because the large number of

¹ “Petition” refers to Qualcomm’s petition in IPR2024-01081 (“Qualcomm IPR”), which includes some differences relative to the petition filed by Samsung Electronics Co., Ltd. (“Samsung”) (Paper 1, “Samsung Petition [or Pet.]”). *E.g.*, *compare* Pet., 37 n.7 with Samsung Pet., 34; Paper 17. Exhibit and paper numbers herein refer to IPR2024-00338 unless otherwise indicated. This Response applies to both Petitions.

² Pursuant to p. 51 of the Consolidated Trial Practice Guide, Patent Owner withdraws its reliance on the Declaration of Erik Chmelar (EX2001).

modules formed too high a bus load, causing the buses to become a “communication bottleneck.” EX1001, 1:26-33; EX2078, 13:10-15:6; EX2070, ¶¶89; *see also id.*, ¶¶62-73) (providing technology overview).

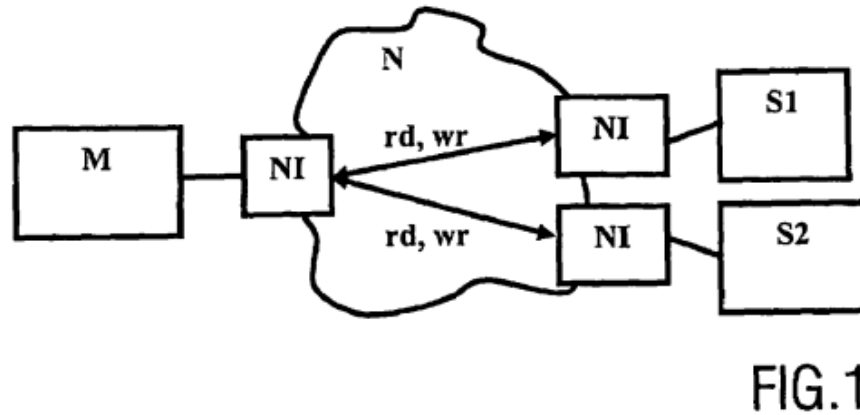
A. The ‘449 Patent Offers Improvements Over Traditional SoCs

To solve these and other problems associated with conventional SoCs, the ‘449 Patent discloses a network-on-chip (“NoC”) interconnect. EX1001, 1:34-35; EX2070, ¶90. NoCs are beneficial because they: (1) “share wires, lowering their number and increasing their utilization” and “are scalable compared to buses and (2) “decouple computation from communication” by “using protocol stacks, which provide well-defined interfaces separating communication service usage from service implementation.” EX1001, 1:38-49; EX2070, ¶¶91-93.

NoCs are fundamentally different than conventional SoC architectures. For example, NoCs decouple computation from communication because the modules (e.g., processing and memory) are indirectly connected via network nodes. EX1001, 3:49-52; EX2070, ¶93. By contrast, in traditional SoC interconnects (e.g., buses, switches, or point-to-point wires), the modules are directly connected. EX1001, 3:52-54; EX2070, ¶93. NoCs also differ from conventional SoCs because they transmit packets through a network of routers and switches. EX1001, 6:26-28, 6:35-42; EX2070, ¶¶70-73; EX2078, 13:10-14:10, 24:20-25:10, 234:17-235:1.

B. Exemplary Embodiments

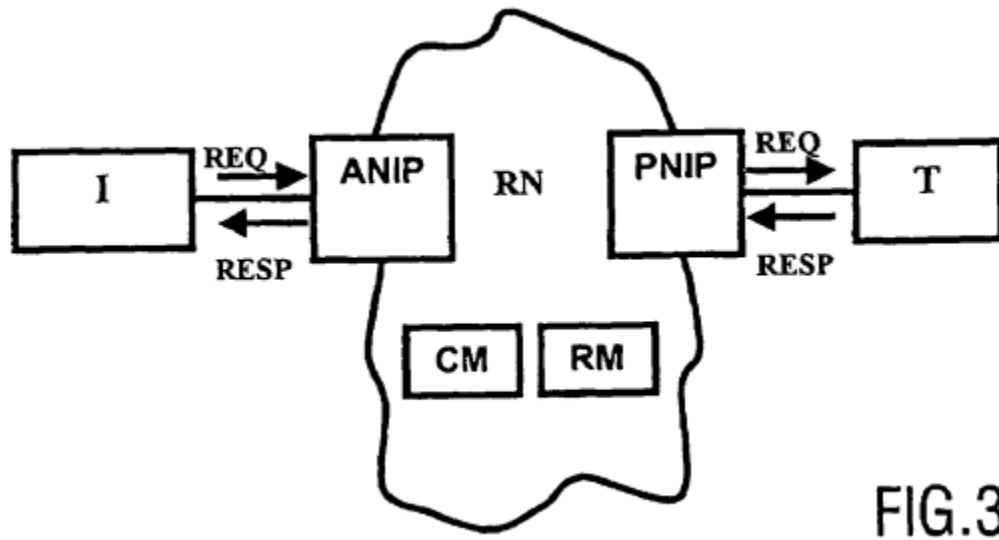
The '449 Patent discloses an integrated circuit including “a master module M, two slave modules S1, S2,” where “[e]ach module is connected to a network N via a network interface NI, respectively.” EX1001, 9:4-7; EX2070, ¶96.



EX1001, FIG. 1

The NIs “manage the communication of the respective modules and the network N,” allowing modules to “perform their dedicated operation without have to deal with communication with the network or other modules.” EX1001, 9:9-14; EX2070, ¶96.

In FIG. 3, the integrated circuit “additionally comprises a communication manager CM and a resource manager RM.” EX1001, 9:66-10:3; EX2070, ¶97.



EX1001 at FIG. 3

The CM and RM can be “arranged in the router network RN” or “in one or some of the network interface NI.” EX1001, 10:3-6; EX2070, ¶98. Network interface ports (ANIP and PNIP) allow “the modules [to] communicate.” EX1001, 9:18-29; EX2070, ¶98. When a request REQ issued by the initiator I is delivered to the target T, it travels “via the ... ANIP, the network RN, and the ... PNIP.” EX1001, 9:34-36; EX2070, ¶98.

Before this request is sent, connection properties must be allocated for the connection. A connection comprises a set of channels, each channel having its own set of connection properties. EX1001, 8:50-52; EX2070, ¶94. Connection properties must be reserved which “result[s] in resource reservation inside the network.” EX1001, 10:62-66; EX2070, ¶95. “To allow ... better resource allocation per

connection,” each channel “can be configured independently.” EX1001, 11:4-7; EX2070, ¶95. This means that, for example, different amount of buffer space is allocated at the network interface ports or different bandwidths can be reserved for each channel. EX1001, 11:7-10; EX2070, ¶95.

To reserve the required connection properties, initiator I sends a request for a connection to the CM that including the desired connection properties. EX1001, 10:7-11; EX2070, ¶99. The CM forwards that request to the RM, which determines whether sufficient resources exist for the desired connection. EX1001, 10:19-26; EX2070, ¶99. The RM then “reserves the available connection, i.e. the required resources, and responds to the” CM with the available connection. EX1001, 10:41-46; EX2070, ¶99. The “CM can accept the connection with the available properties” or “may also refuse the offered connection if the available properties or the resources thereof are not acceptable.” EX1001, 10:46-51; EX2070, ¶99.

By allocating specific resources, the inventions achieve “better resource allocation per connection.” EX1001, 11:4-7; EX2070, ¶100. The ‘449 Patent “prevent[s] [] an inefficient bandwidth utilization,” and allows the request part of the connection to have one set of connection properties and the response part of the connection to have a different set of connection properties. EX1001, 11:47-50; EX2070, ¶100. Further, by performing the resource allocation in the network or in the network interface, the ‘449 Patent “abstract[s]” communication services “from

the network internals as much as possible.” EX1001, 17:60-61; EX2070, ¶91. This architecture also “decoupl[es] the computation from communication” by “allow[ing] IPs (the computation part), and the interconnect (the communication part) to be designed independently from each other.” EX1001, 17:61-65; EX2070, ¶91. As a result of this decoupling, IP modules can “be designed independent from the network and ... be re-used” and can “be introduced non-disruptively” into a NoC. EX1001, 8:7-12, 18:2-5; EX2070, ¶92.

C. On-Chip and Off-Chip Networks Have Different Premises

While there are perhaps some surface-level parallels, NoCs are fundamentally different than off-chip networks (e.g., local area networks (“LAN”), wide area networks (“WAN”)). EX2070, ¶¶74-81 The ‘449 Patent teaches that “NoC’s premises are different from off-chip networks, and, therefore, most of the network design choices must be reevaluated.” EX1001, 1:66-2:1; EX2070, ¶101. This is because “[o]n-chip networks have different properties (e.g., tighter link synchronization) and constraints (e.g., higher memory cost) leading to different design choices, which ultimately affect the network services.” EX1001 at 1:66-2:5; EX2070, ¶101.

On-chip and off-chip network differ in terms the implementation and design of a network interface. EX2070, ¶101. Computation in an on-chip network “comes at a relatively high cost compared to off-chip networks.” EX1001, 2:16-17. By

contrast, “[a]n off-chip network interface usually contains a dedicated processor to implement the protocol stack up to network layer or even higher, to relieve the host processor from the communication processing.” EX1001, 2:17-21; EX2070, ¶101. However, “[i]ncluding a dedicated processor in a network interface is not feasible on chip” because the network interface will become “larger than the IP to be connected to the network.” EX1001, 2:21-24; EX2070, ¶101. It not feasible to run the protocol stack on the IP itself because “IPs have one dedicated function only, and do not have the capabilities to run a network protocol stack.” EX1001, 2:24-27; EX2070, ¶101.

The ‘449 Patent also teaches that on-chip and off-chip networks differ with respect to data reordering. EX2070, ¶102. “For off-chip networks out-of-order data delivery is typical.” EX1001, 3:11-12; EX2070, ¶102. However, in NoCs, “data can be forced to follow the same path ... with no reordering.” EX1001, 3:12-15; EX2070, ¶102. This renders off-chip network designs inapplicable to on-chip networks because “reordering modules are no longer necessary.” EX1001, 3:15-17; EX2070, ¶102. The ‘449 Patent also teaches that “guarantees” and “resource constraints” differ for on-chip networks compared to off-chip networks, leading to different design considerations. EX1001, 3:34-46, 2:7-15; EX2070, ¶103. NoCs provide more reliable communication relative to off-chip networks. EX1001, 2:43-53; EX2070, ¶104.

On-chip and off-chip networks also differ with respect to the physical size of networking components. EX2070, ¶105. On-chip networks, have “tight ... resource constraints,” meaning “that the network components (i.e., routers and network interfaces) must be fairly simply to minimize computation and memory requirements.” EX1001, 2:43-46; EX2070, ¶¶104-105. To overcome these physical size constraints, on-chip networks use more “wires [which] provide a reliable communication medium” that “help avoid the considerable overhead incurred by off-chip networks for providing reliable communication.” EX1001, 2:46-49; EX20X70, ¶105.

In sum, the ‘449 Patent teaches that “NoCs have different properties from both existing off-chip networks and existing on-chip interconnects.” EX1001, 17:42-44; EX2070, ¶106. As such, “existing protocols and service interfaces cannot be adopted directly to NoCs.” EX1001, 17:44-46; EX2070, ¶106. Instead, the network “must take the characteristics of NoCs into account.” *Id.* As an example, the TCP/IP off-chip networking protocol “assume[s] the network is lossy, and includes significant complexity to provide reliable communication,” thus making it “not suitable in a NoC.” EX1001, 17:46-51; EX2070, ¶106.

III. SUMMARY OF PETITIONER'S REFERENCES

A. Goossens2002 (EX1005)

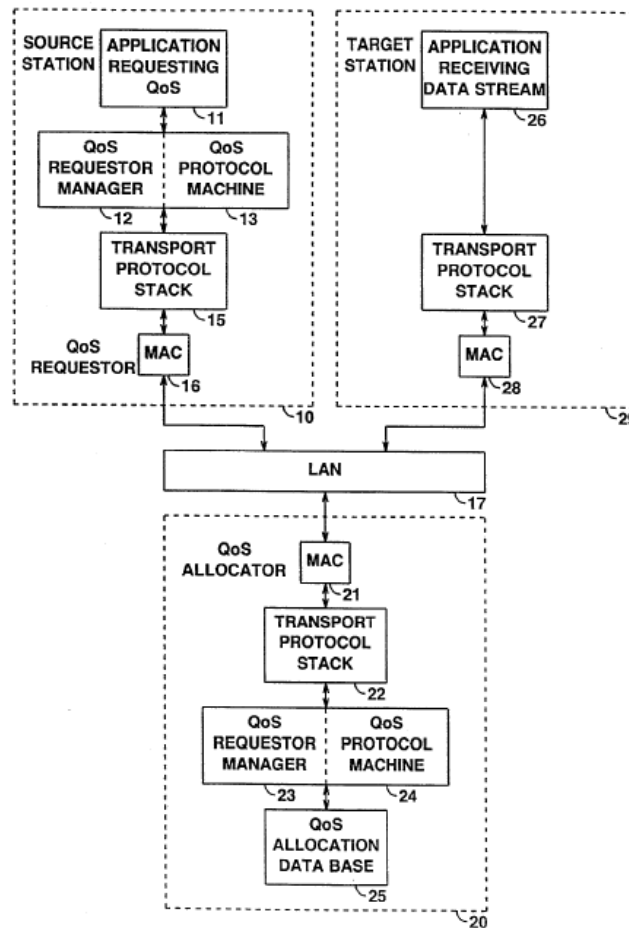
Goossens2002 relates to the Aethereal NoC developed by Philips and prior work by the named inventors of the '449 Patent, Kees Goossens and Andrei Radulescu. EX1005, 1. Goossens2002 describes a “network on silicon (NOS)” that “implement[s] communication between IP cores in future technologies.” EX1005, Abstract; EX2070, ¶107. The NOS includes a network, in which a packet traverses several routers (also referred to as “hop[s]”). EX1005, 1-2.

Communication between IP blocks is performed on connections, which “combine[] multiple channels and can include flow control and reordering for lossless in-order (multicast) transmission.” EX1005, 3; EX2070, ¶107. Each simplex channel can be either GT (i.e., having throughput and latency guarantees) or be BE (having an unspecified finite latency upper bound). *Id.*

Goossens2002 explains that “guaranteed services offer many advantages over best-effort services” because it makes the network “predictabl[e].” EX1005, 3; EX2070, ¶108. Predictability is achieved during run-time by “an application or quality-of-service manager,” which “reconfigures the SOS” and “observe[s] and steer[s] the NOS.” EX1005, 3; EX2070, ¶108.

B. Drake (EX1006)

Drake describes a quality-of-service management (“QoS”) management system for LANs, such as Token Ring networks. EX1006, Abstract, 2:10-13; EX2070, ¶109. Drake’s QoS management system is “entirely concentrated in a single QoS management station on the LAN, thereby significantly reducing the complexity of introducing QoS management into existing LAN networks.” EX1006, 2:65-3:3; EX2070, ¶109.



EX1006, FIG. 1

Application 11 requests a QoS connection to the target station 29. EX1006, 4:26-29; EX2070, ¶110. The QoS requestor manager 12 communicates with application 11 “using internal messages.” EX1006, 4:62-65; EX2070, ¶110. QoS requestor manager 12 and QoS protocol machine 13 “assemble a request to reserve a QoS connection” through the LAN between source 10 and target 29. EX1006, 4:32-37; EX2070, ¶110. QoS Allocator 20 receives the request, examines the resources of the LAN, and determines whether a path “which satisfies the requested level of QoS” exists. EX1006, 4:50-54; EX2070, ¶110.

Once the QoS Allocator 20 determines that a path exists in LAN 17 for the requested level of QoS, it sends “an allocation acceptance message,” which is “received at the source station 10.” EX1006, 11:22-26; EX2070, ¶110. “If the allocation has been accepted, ... the multimedia file is transmitted to the target station 29.” EX1006, 11:26-28; EX2070, ¶110.

C. Goossens2003 (EX1007)

Goossens2003 relates to the Aethereal NoC and prior work by the named inventors of the ‘449 Patent. Goossens2003 describes that “introducing guaranteed services” into a NoC “enables IP re-use and platform-based design.” EX1007, Abstract; EX2070, ¶111. In Goossens2003, communication in the NoC is performed on connections, which is a “communication between one master and one or more slaves, with an associated service level.” EX1007, 10 EX2070, ¶111.

The Goossens2003 NoC includes a combined GT-BE router and a network interface. EX1007, 16-17 EX2070, ¶¶111. The GT router “offers a fixed end-to-end latency for its traffic, which has the highest priority,” and the BE router “uses all the bandwidth (slots) that has not been reserved or is not used by GT traffic.” EX1007, 16; EX2070, ¶¶111-112.

IV. LEVEL OF SKILL IN THE ART

Petitioner contends that a person of ordinary skill in the art (“POSITA”) “would have had at least a Bachelor’s degree in computer science, electrical engineering, computer engineering, or an equivalent technical degree, and two or more years of experience with system-on-chip, interconnect, or networking technologies.” Petition, 14. For purposes of this proceeding only, Patent Owner applies Petitioner’s proposed level of skill. EX2070, ¶¶56-61.

V. CLAIM CONSTRUCTION

Despite offering multiple claim constructions in district court litigation, Petitioner argued “that the Board does not need to construe any claim term for purposes of evaluating the prior art in this Petition.” Petition, 15. As discussed below, Patent Owner submits that certain claim construction issues must be resolved.

A. The “First Module” and “Communication Manager” Are Separate and Distinct

In the Institution Decision, the Board preliminarily found that the claims do not “preclude the claimed ‘communication manager’ from residing in the claimed

‘first module.’” Paper 14, 25. For the reasons discussed below, this construction is inconsistent with intrinsic evidence and the understanding of a POSITA. The claimed first module and communication manager (“CM”) should be construed as separate and distinct claim elements. EX2070, ¶114.

The plain claim language gives rise to a presumption that the first module and CM are distinct elements of the invention. *Becton, Dickinson & Co. v. Tyco Healthcare Group, LP*, 616 F.3d 1249, 1254 (Fed. Cir. 2010) (where “a claim lists elements separately, the clear implication of the claim language is that those elements are distinct component[s] of the patented invention”) (citation and quotation marks omitted). Claim 10 recites “*the first module issuing a request* for a connection with the second module *to a communication manager*.” EX1001, 19:32-35. Similarly, claim 6 recites “said first module (M; I) is adapted *to issue a request* (REQ) for a connection ... *to said communication manager* (CM).” EX1001, 18:60-63. If the claims were construed to allow the CM to be inside the first module, this would result in a nonsensical scenario where the first module would issue a request to itself. EX2070, ¶115.

The specification is consistent with the plain meaning of the claims. In FIG. 3, the CM is separate and distinct from initiator I (an example of the first module). EX2070, ¶116.

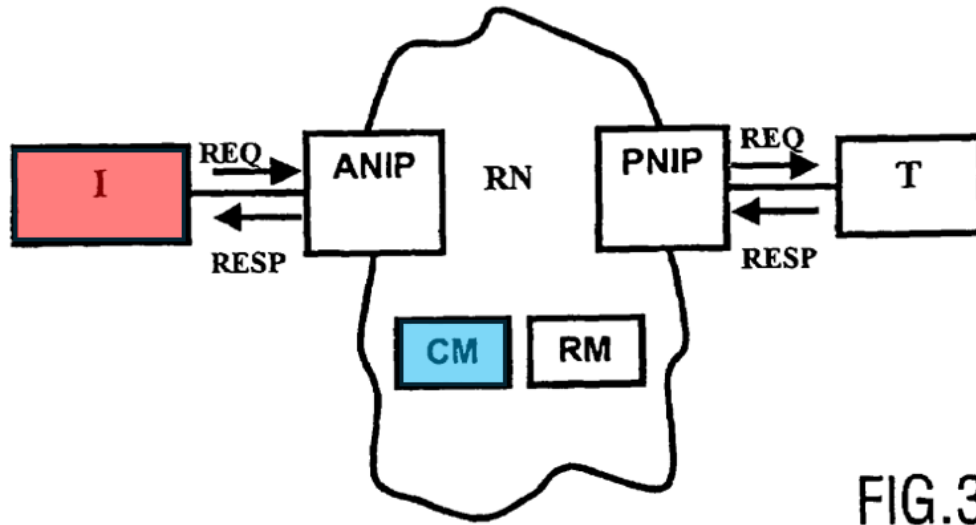


FIG.3

EX1001, FIG. 3 (annotated)

Initiator I is outside the network RN, whereas the CM is inside the network RN. EX2070, ¶¶116-117. The specification teaches that the CM and RM “are arranged in the router network RN, but they can also be arranged in one or some of the network interfaces NI.” EX1001, 10:3-6. The specification, however, does not contemplate the CM being arranged outside of the RN or NI, and does not contemplate positioning the CM within initiator I. EX2070, ¶116. The Board’s preliminary construction is inconsistent with these examples. *See Quanergy Sys., Inc. v. Velodyne Lidar USA, Inc.*, 24 F.4th 1406, 1416 (Fed. Cir. 2022) (finding “broader construction” that was “inconsistent with the specification ... to be unreasonable”); *Carrum Techs., LLC v. Unified Pats., LLC*, No. 2020-2204, 2021 WL 3574209, at *6 (Fed. Cir. Aug. 13, 2021) (rejecting construction that was “untethered to the specification”).

The Board's preliminary construction is also at odds with the objectives of the '449 Patent. *Micron Tech., Inc. v. N. Star Innovations, Inc.*, 855 F. App'x 679, 684 (Fed. Cir. 2021) (holding that the Board properly rejected claim construction that "fail[ed] to accord with the objectives of the ... invention"). One of the key objectives of the '449 Patent is to "decouple computation from communication." EX1001, 1:44-45, 15:61-63, 17:60-65; EX2070, ¶118. Decoupling computation from communication "allows [for] IPs (the computation part), and the interconnect (the communication part) to be *designed independently from each other.*" EX1001, 17:60-65; EX2070, ¶118. This allows for IP "re-use[]." EX1001, 8:11-12; EX2070, ¶118. The '449 Patent describes using a "request-response transaction model" (similar to that of bus-based interconnects) to "ease the migration of current IPs to NoCs." EX1001, 15:63-66; EX2070, ¶119.

If the first module and CM were integrated as a single component, communication and communication would *not* be decoupled. EX2070, ¶118. Moreover, the positioning the CM within the first module would mean that they cannot be designed independently. EX2070, ¶119. A POSITA would also understand that such redesigning is contrary to the objective of the '449 Patent which is to seamlessly incorporate existing IP modules into a network on chip. *Id.*

The separateness of the claimed first module and CM is further supported by Petitioner's expert's testimony that the CM can be in the network or a network

interface, and those are the only “possibilities.” EX2078, 75:21-76:5, 76:20-78:8, 108:4-14. The CM cannot be within the first module.

B. Communication Manager

The Institution Decision found that the term “communication manager” does not “require[] an explicit construction.” Institution Decision, 22-23. However, the Eastern District of Texas construed this term as being subject to Section 112, ¶ 6 and identified (1) the function as “forwarding a request to a resource manager” and (2) the structure as “portion of the circuit configured to implement the scheme disclosed in the ‘449 Patent at 10:19-24, 10:41-54.” EX2022, 60, 38-42. Similarly, while there was no express *Markman* order, Judge Gilstrap indicated that the Court would adopt the same construction in the district court litigation involving Samsung. EX2084, 3:19-4:11. In the Qualcomm Litigation, Petitioner also argued that “communication manager” is subject to § 112, ¶ 6. EX2040, 25. However, as discussed below, neither Petitioner nor its expert expressly analyzed whether the references in Grounds 1-2 disclose the claimed “communication manager” under the district court § 112, ¶ 6 construction.

**C. “Adjustable Independently” / “Independently Configurable”
(Claims 2, 10)**

The term “adjustable independently” appears in claim 2, and the term “independently configurable” appears in claim 10. The parties agreed in related district court litigation that “independently configurable” should be construed as

“[a]ble to be configured with connection properties that do not depend on those of another configuration.” EX1032, 2; EX2040, 13.

There is no dispute that “adjustable independently” and “independently configurable” are synonymous, except for the fact that “adjustable independently” refers to the connection properties of the communication channels, while “independently configurable” refers to the communication channels having connection properties. EX2078, 117:3-10.

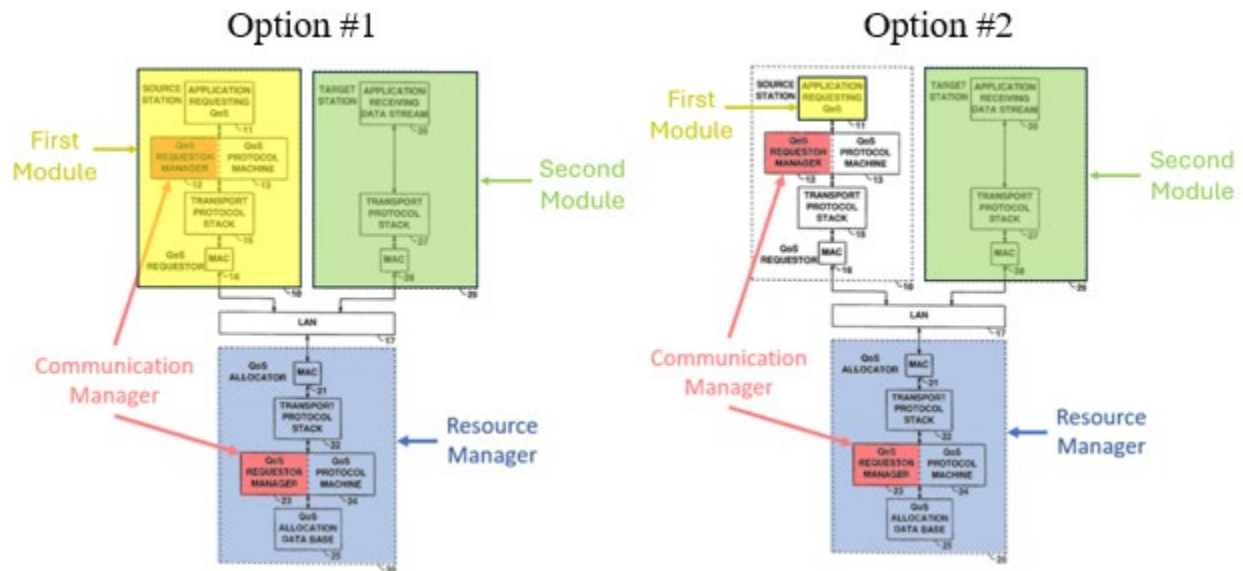
VI. PETITIONER HAS NOT ESTABLISHED THAT THE CHALLENGED CLAIMS ARE UNPATENTABLE

Petitioner raises two challenges: (1) obviousness over Goossens2002 in view of Drake (claims 2, 6, 9-16); and (2) obviousness over Goossens2003 in view of Drake (claims 2, 6, 9-16). Petitioner failed to carry its burden for either ground.

A. Petitioner Takes Inconsistent Positions Regarding What Aspect of Drake Corresponds to the “First Module”

Petitioner and its expert have taken inconsistent positions regarding how they map Drake to the “first module.” As noted in the Preliminary Response, the Petition inconsistently applies either Drake’s (1) entire source station 10 or (2) only the application 11 within the source station 10 as the claimed “first module.” IPR2024-01081, Paper 9 at 28-31. Parts of the Petition expressly rely on Drake’s source station 10 for the “first module” and the target station 29 as the “second module.” Pet., 26-27, 31-32, 43, 67; EX1003, ¶¶97, 134, 198. But other parts of the Petition refer to

the “*application [11] in [the] source station* (i.e., first module).” Pet., 40-41 (including an annotated version of Drake’s Figure 1 that highlights application 11 specifically, not source station 10 as a whole), 59, 65-66; EX1003 ¶¶129-31, 177, 195. These two options are illustrated below:



EX1006, Fig. 1 (annotated per Petitioner (Pet., 37), with additional annotations).

The Institution Decision found that “Petitioner consistently identifies Drake’s source station 10 as the claimed ‘first module,’” i.e., option #1. IPR2024-01081, Paper 14 at 23-24. During his deposition, Dr. Mowry initially testified that Drake’s source station 10 corresponds to the claimed “first module.” EX2078, 173:8-13. But Dr. Mowry later clarified that *only the application 11* within source station 10 corresponds to the claimed “first module”:

Q. Can you tell me which of the components in figure 1 of Drake correspond to the claimed first module?

A. Well, in this scenario it's box 11, which is inside the source station.

EX2078, 174:23-175:19; *see also id.*, 174:10-19 (“I’m saying that the application in a source station – so the application is box 11. The ... other things within box 10 ... are the network interface”), 175:21-176:2 (“box 11 is the first module”).

This testimony from Petitioner’s expert contradicts (i) the Board’s finding in the Institution Decision and (ii) any purported reliance by Petitioner on Drake’s source station as the first module. Dr. Mowry’s testimony underscores the inconsistencies in the Petition and its failure to clearly specify where the “first module” is found in the prior art, as required by 37 C.F.R. § 42.104(b)(4).³ The Board has held that such inconsistencies violate the Board’s rules. 37 C.F.R. § 42.104(b)(4); *Power Integrations, Inc. v. Semiconductor Components Indus., LLC*, IPR2017-01907, Paper 31 at 22-24 (PTAB Mar. 11, 2019) (“Petitioner’s inconsistent identification of the claimed [element] runs afoul of [37 C.F.R. § 42.104(b)(4)]”); *Denso Corp. v. Collision Avoidance Techs. Inc.*, IPR2017-01715, Paper 27 at 69 (PTAB Jan. 22, 2019) (“Petitioner’s inconsistent arguments ... do not meet the requirement of our rules”); *Kranos Corp. v. Riddell, Inc.*, IPR2016-01649, Paper 25

³ To the extent Petitioner attempts to rely on Drake’s application 11 as the “first module,” this would constitute improper new argument. Consolidated Trial Practice Guide at 73-74.

at 41 (PTAB Feb. 7, 2018) (finding it was “unclear from Petitioner’s [inconsistent] argument[s] where each element of challenged claims ... is found”).

Unless otherwise noted, this Response assumes Petitioner relies on Drake’s source station 10 (associated with Goossens2002’s or Goossens2003’s IP) as the “first module,” given the Petition’s express arguments to that effect and the Board’s Institution Decision. *See* Pet., 26-27, 31-32, 43, 47, 59, 61, 67, 70; IPR2024-01081, Paper 14 at 23-25.

B. Petitioner Failed to Meet its Burden for Ground 1

Petitioner failed to establish that Goossens2002 and Drake renders obvious any of claims 2, 6, and 9-16. Petitioner relies on Goossens2002 for the claimed “[i]ntegrated circuit comprising ... [a] network” and further relies on Goossens2002 or Drake for the claimed “set” of: “communication channels” with “connection properties ... being adjustable independently” (claim 2) or “independently configurable” “communication channels” (claim 10). Pet., 21-23, 26-32, 45-46. Petitioner admits that Goossens2002 does not teach the claimed “communication manager” or “resource manager” or the related limitations, and instead relies on Drake’s QoS requestor manager 12 and QoS allocator 20 for those claim elements.⁴

⁴ While Petitioner suggests that Goossens2002’s quality-of-service manager is a “resource manager” for limitations 1[c]-[d], Petitioner relies solely on Drake’s QoS

Pet., 24-26, 32-38, 40-44, 46-47; EX2078, 134:12-20, 135:16-19. Petitioner alleges that these two Drake QoS components could have been incorporated into Goossens2002. Pet., 16-20, 32-38, 40-44, 46-47.

Petitioner failed to meet its burden for Ground 1 because (1) neither Goossens2002 nor Drake discloses the “independently configurable” or “independently adjustable” limitations, (2) a POSITA would not have combined Goossens2002 and Drake to meet the “communication manager” and “resource manager” limitations, and (3) the alleged Goossens2002 and Drake combination fails to meet the “communication manager” and “resource manager” limitations.

**1. Goossens2002 and Drake Do Not Disclose the
“Independently Configurable[/Adjustable]” Limitations**

Goossens2002—Petitioner alleges that Goossens2002 discloses multiple channels and certain connection properties. *See* Petition, 27-29. Petitioner also alleges that “a POSITA would have understood that the connection properties of the

allocator as the “resource manager” for limitation 1[g] and all other claims. Pet., 23-24, 26-27, 32-34; *see also* 41-43 (relying on Drake’s QoS allocator as the “resource manager” for 6[b]-[c]), 47 (relying on 1[g] and 6[b]-[c] for 10[b]-[d]).

different channels are ‘adjustable independently.’”⁵ *Id.*, 29 (citing EX1003, ¶¶103-105). This argument should be rejected for two reasons.

First, the Petition provides no explanation as to why a POSITA would supposedly have understood that the connection properties for Goossens2002's channels are adjustable independently. Petition, 29. Petitioner's citation to Dr. Mowry's declaration “to support conclusory statements for which the Petition does not otherwise provide an argument or explanation” is an improper incorporation by reference. *Cisco Sys.*, Paper 12 at 9; *see also* 37 C.F.R. § 42.6(3); *supra*, §IX.A.

Second, contrary to Petitioner's assertion, Goossens2002 does not expressly disclose channels that are independently configurable. EX2070, ¶¶154-155. While not explained in the Petition, Dr. Mowry alleges that a POSITA would have understood that the properties of each channel are adjustable independently because “rather than describing that each connection has certain properties, Goossens2002 describes that each channel has certain properties.” EX1003, ¶103. But Goossens2002 does not say “*each* channel” has certain connection properties; instead, it states that “[a] *channel* can have a combined throughput and latency

⁵ Petitioner treats the phrases “independently configurable” in claim 10 and “adjustable independently” in claim 1 interchangeably. *See* Petition, 43-44.

guarantee (GT), or be best effort (BE), with an unspecified finite latency upper bound.” EX1005, 3; EX2070, ¶155.

Drake—Petitioner does not contend that Drake expressly discloses multiple channels; instead, Petitioner assumes that Drake discloses multiple channels because data can be sent from the source station to the target station in both the “forward direction” and the “backward direction.” Pet., 29. In other words, Petitioner and its expert assumed that because Drake sends data in “forward” and “backward” directions, that *necessarily* means that Drake discloses multiple channels. EX2078, 185:18-23. That assumption is incorrect. A POSITA would understand that a single channel can send data in forward and backward directions. EX2070, ¶157.

Drake discloses that the LAN 17 is a Token Ring network. EX1006, 2:10-13, 4:20-23, 6:66-7:6; EX2070, ¶158; EX2078, 186:4-9. A POSITA would understand that Token Ring networks employ duplex channels. EX2070, ¶158; EX2078, 186:10-187:18. A “duplex” channel sends data in two directions (e.g., a forward direction and a backward direction). EX2070, ¶¶84-85, 158. Half-duplex channels send data in two directions, but not simultaneously, while full-duplex channels can send data in two directions simultaneously. EX2070, ¶¶84-85, 158. Because Drake discloses that its LAN is a Token-Ring network, a POSITA would understand that Drake discloses one duplex channel between the source station 10 and target station 29 that can send data in forward and backward directions. EX2070, ¶158. Because

Drake does not disclose multiple channels, Drake necessarily does not disclose the “independently configurable” or “adjustable” limitations. EX2070, ¶158.

2. A POSITA Would Not Have Combined Goossens2002 and Drake to Meet the “Communication Manager” and “Resource Manager” Limitations

Petitioner argues that certain components and functions of Drake's QoS management system could be implemented in Goossens2002 but fails to explain specifically *why* and *how* those aspects of Drake's QoS system would purportedly be incorporated into and work with Goossens2002. Regardless, a POSITA would not have been motivated to combine Goossens2002 and Drake, at least because (1) the proposed additions are redundant of features Goossens2002 already provides and (2) Goossens2002 and Drake teach away from the proposed combination. EX2070, ¶160-210.

a. Petitioner's Motivation to Combine Arguments are Generic and Untethered to Specific Claim Limitations

The entirety of Petitioner's argument as to why a POSITA would allegedly combine Goossens2002 and Drake is confined to Section VII.A.1 of the Petition. Pet., 16-20 (“Petition Section VII.A.1”). Petition Section VII.A.1, however, merely asserts that a POSITA “would have looked to Drake's disclosure to implement a ‘QoS requestor manager’ to formulate requests for guaranteed services with particular properties and a ‘QoS allocator’ to determine whether the required network resources are available for the requested services,” with no explanation as

to how Drake's teachings would work with Goossens2002 (e.g., IPs, NOS, and existing service requests). Pet., 16-20. For example, Petitioner asserts that the *single* QoS component in Goossens2002 (i.e., quality-of-service manager) would be substituted for *two* QoS components from Drake (i.e., QoS requestor manager and QoS allocator), without explaining why or how. Pet., 16-17. Petitioner's expert fares no better. EX1003, ¶¶72-82; EX2070, ¶¶162-172.

Petitioner's failure to explain how Goossens2002 and Drake would work together or tie its alleged motivation to combine to specific limitations is fatal to Ground 1. *See, e.g., ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1327-28 (Fed. Cir. 2012) (obviousness analysis failed to explain specifically how the references would be combined and was not specific to the claim limitations); *Braintree Labs., Inc. v. Novel Labs., Inc.*, 749 F.3d 1349, 1359 (Fed. Cir. 2014) ("[Party] failed to prove ... why the prior art references would have worked together" (cleaned up)); *PersonalWeb Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 993-94 (Fed. Cir. 2017) (finding a failure to explain "how the combination of the two references was supposed to work"); *Juniper Networks, Inc. v. Smart Path Connections, LLC*, IPR2021-01356, Paper 27 at 48-50 (PTAB Jan. 19, 2023) (finding petitioner did "not adequately explain[] how [one reference] would be

modified to incorporate teachings from [another reference]"); *see also In re NuVasive, Inc.*, 842 F.3d 1376, 1381-82 (Fed. Cir. 2016).

b. Claim 2

Communication Manager—Petitioner concedes that Goossens2002 does not disclose the claimed “communication manager” and relies on Drake’s QoS requestor manager 12. Pet., 35-38, 17.⁶ However, Petitioner’s only alleged motivation for incorporating Drake’s QoS requestor manager 12 into Goossens2002 is that “a POSITA would have looked to Drake’s disclosures regarding a QoS requestor manager to obtain the benefits of Drake’s known solution to ensuring the availability of network resources for guaranteed services.” Pet., 35-38 (citing Petition Section VII.A.1). But neither this statement nor Petition Section VII.A.1 explains *why* a POSITA would implement Drake’s QoS requestor manager in Goossens2002 or *how* it would work with Goossens2002. *See* Pet., 35-38, 16-20. Petitioner’s expert fares no better. EX1003, ¶¶117-22.

A POSITA would not have been motivated to incorporate Drake’s QoS requestor manager 12 in Goossens2002 because it would be redundant. Petitioner asserts that Drake’s QoS requestor manager requests a QoS connection. Pet., 35;

⁶ Petitioner disavowed any reliance on Drake’s QoS requestor manager 23 for the claimed “communication manager.” Pet., 37 n.7; Paper 10, 55-56.

EX2070, ¶177. However, Goossens2002's IP already does this, as the Petition recognizes: "[Goossens2002] IPs ... 'can set up and remove connections,'" and "the IPs do so by making a 'service request' that includes information regarding the performance requirements of the connection." Pet., 40; EX2070, ¶177. That is, Drake's QoS requestor manager and Goossens2002's IP both purportedly make a request for a connection with sufficient properties. EX1006, 4:32-37; EX1005, 2-3; Pet., 35, 40; EX2078, 131:13-132:12, 199:6-14, 228:18-229:8; EX2070, ¶177. While Petitioner asserts that Drake's QoS requestor manager communicates with the alleged "resource manager" (Drake's QoS allocator), a POSITA would have understood that this could simply be done by Goossens2002's IP such that there is no need to add an additional component. Pet., 35; EX2078, 198:7-22, 152:1-12, 173:8-11, 199:15-18; EX2070, ¶178.

A POSITA would have no reason to add Drake's QoS requestor manager in Goossens2002 because Goossens2002's IP can already generate a connection request and send it to the alleged "resource manager" without Drake's QoS requestor manager. EX2070, ¶178; *South-Tek Systems, LLC v. Engineered Corrosion Solutions, LLC*, 748 Fed. App'x 1003, 1006 (Fed. Cir. 2018) (finding no motivation "[g]iven the redundant functions" of primary and secondary reference elements); *In re Anova Hearing Labs, Inc.*, 809 Fed. App'x 840, 843 (Fed. Cir. 2020) (finding the Board "d[id] not explain why a [POSA] would be motivated to modify Brown, which

already includes vents”); *see also Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1369 (Fed. Cir. 2012).

Further, to the extent Petitioner suggests that a POSITA would be motivated to modify Goossens2002 with Drake to achieve the benefit of “ensuring the availability of network resources for guaranteed services,” that argument is flawed because Goossens2002 already describes “a NOS that offers guaranteed services” and further describes accurately modeling “resource availability.” Pet., 17, 19, 37; EX1005, 3; EX2070, ¶190. A POSITA would not have motivation to modify Goossens2002 to purportedly obtain a benefit that is already achieved by Goossens2002. *South-Tek*, 748 Fed. App’x at 1006; *Anova*, 809 Fed. App’x at 843.

Another fundamental problem with the Petition is that it fails to specify *where* Drake’s QoS requestor manager 12 would be implemented in Goossens2002. Pet., 35-38, 16-20. This matters because Goossens2002 teaches that components involved in communication, like Drake’s QoS requestor manager, should *not* be implemented in an IP block, whereas Drake teaches that the QoS requestor manager should *not* be implemented in a network. EX2070, ¶¶180-181. In other words, consistent with the reality that on-chip and off-chip networks have different premises (*supra* §II.C), Goossens2002 and Drake teach completely opposite solutions. EX2070, ¶187. Drake is premised on its QoS components being implemented in stations attached to networks, so that the network stays the same, whereas Goossens2002 is premised on

implementing such communication components within the network, so that the IPs stay the same. EX1006, Abstract, Fig. 1, 4:18-26, 4:32-47, 4:62-67, 14:17; EX2078, 133:8-134:11, 138:5-11, 140:1-141:7, 142:21-143:7, 150:8-151:21; EX1005, 1-3; EX2070, ¶187.

Goossens2002 is emphatic that its IP blocks should **not** contain communication components like Drake's QoS requestor manager. EX1005, 1 (“[M]ost importantly, decoupling of computation (IPs) and communication (NOS) enables compositional layout and timing closure”); EX2070, ¶180; EX2078, 133:8-134:11 (agreeing a communication component would not go inside Goossens2002's IP). Goossens2002 teaches that this is important so that IP blocks can be reused and designed independently from the network. EX1005, 1, 2; EX2070, ¶180. A POSITA therefore would not modify Goossens2002 to include the QoS requestor manager 12 in an IP block because Goossens2002 teaches away from doing so. EX2070, ¶180; *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009).

On the other hand, Drake's QoS requestor manager is purposefully within source station 10 rather than within the LAN. EX1006, Fig. 1, 4:18-26, 4:32-47, 4:62-66, 14:17; EX2070, ¶179; Pet., 35; EX2078, 138:5-11, 140:1-141:7, 142:21-143:7. Drake even refers to source station 10 as the “*requestor station 10*” and teaches that the network is a “*prior art [LAN] 17.*” EX1006, 14:17, 4:18-26

(emphases added); EX2070, ¶179. Drake is clear that QoS management should *not* be implemented in the LAN because doing so would be “complex[.]” EX1006, 2:57-3:3; EX2070, ¶206. Nowhere does Drake suggest that QoS requestor manager 12 can be *outside* of the source station. EX2070, ¶180; EX2078, 150:8-151:21. In fact, a POSITA would have understood that the QoS requestor manager 12 is software that could not be outside of the source station. EX2070, ¶180.

A POSITA would not modify Goossens2002 to include Drake's QoS requestor manager in the NOS because Drake expressly teaches away from positioning the QoS requestor manager within a network. EX2070, ¶187; *DePuy Spine.*, 567 F.3d at 1327. Moreover, under Petitioner's proposed definition, it would not be within the routine skill for a POSITA to implement Drake's QoS requestor manager in Goossens2002's NOS. EX2070, ¶¶201-210. Drake teaches that it would be complex to implement QoS in the network. EX1006, 2:57-3:3; EX2070, ¶206. It would be orders of magnitude more complex to implement the QoS requestor manager in the Goossens2002 NOS than the LAN in Drake. EX2070, ¶206. A POSITA under Petitioner's definition would not have a reasonable expectation of success in combining Goossens2002 and Drake in this manner. EX2070, ¶201-210.

The Institution Decision found that Petitioner's proposed modification does not “modify[] Goossens2002's IP block to include Drake's requestor manager 12” because “Petitioner proposes implementing Drake's QoS management process in

[Goossens2002's] NOS, not modifying an IP block." Paper 10, 66 (citing Samsung Pet., 15-19, corresponding to Pet., 16-20). It is true that the Petition does not expressly say that Goossens2002's IP block would be modified. *See* Pet., 16-20. But it is equally true that the Petition does not expressly say that Drake's requestor manager 12 would be implemented in Goossens2002's NOS. *See* Pet., 16-20. That is the problem.

Patent Owner sought to clarify this ambiguity during Dr. Mowry's deposition. Dr. Mowry testified that he formed no opinions on implementing Drake's QoS requestor manager in Goossens's IP block. EX2078, 205:14-206:12. When pressed to explain where it would be implemented, Dr. Mowry testified that Drake's QoS requestor manager could be implemented as a "centralized piece of hardware," even though Drake shows the QoS requestor manager in a "distributed design." EX2078, 207:24-209:13, 150:13-22; *see also* EX2078, 205:20-207:22 (relying on hindsight from the '449 Patent); 203:10-209:13 (repeatedly confusing Drake's QoS requestor manager for the centralized QoS allocator and claimed "resource manager"). Eventually, Dr. Mowry testified that Drake's QoS requestor manager can go "*anywhere* on the chip" in Goossens2002 as long as it is "[attached or connected] to the [NOC]." EX2078, 211:4-25, 233:4-22 (emphasis added). This opinion is not in his declaration, ignores the teachings of Goossens2002 and Drake (discussed above), and contradicts the Institution Decision's interpretation (noted above) of the Petition.

Petitioner and Dr. Mowry's analysis apparently contemplates implementing Drake's requestor manager 12 in Goossens2002 *outside* of the NOS. A POSITA would not make such a modification to Goossens2002 for several reasons. EX2070, ¶¶185-188. First, as taught in the '449 Patent, unlike Drake's off-chip network, Goossens2002's NoC is resource constrained, and it is not feasible to add dedicated hardware due to space constraints. EX1001, 2:3-46; EX2070, ¶188. Adding Drake's QoS requestor manager 12 as a separate component on Goossens2002's NoC would undesirably increase the form factor of the IC and/or limit space for other components. EX2070, ¶188. It would also increase the circuit component count and manufacturing complexity. *Id.* Further, implementing the QoS requestor manager 12 as separate component connected to the NOS would introduce additional latency each time an IP block needed to communicate with it. *Id.*

Resource Manager—Limitations 1[c] and 1[g] relate to the claimed "resource manager." Petitioner's analysis contains no discussion whatsoever as to *why or how* a POSITA would modify Goossens2002 to meet these limitations. Pet., 26 (1[c]), 32-34 (1[g]). For example, Petitioner does not explain where Drake's QoS allocator would purportedly receive requests from in the alleged combination with Goossens2002 (e.g., from Goossens2002's IP or somewhere else). Pet., 32-34. Petitioner's expert fares no better. EX1003, ¶¶90-94, 113-16.

Additionally, Petitioner's argument that a POSITA would look to Drake to fill in the missing details from Goossens2002, including the missing resource and communication managers, ignores the fundamentally different architectures in these references. Pet., 17, 19, 26; *supra*, §II.C (explaining the different premises of on and off chip networks). Drake's QoS management is specifically directed to local area networks (LANs). EX1006, Abstract, 1:6-11, 1:13-2:21, 2:25-3:29, 3:31-4:10, 15:39-46; EX2070, ¶109. As discussed above, Drake teaches that the QoS management components are attached to, but not implemented within, the network. EX1006, 4:18-26, 4:32-47, 4:62-65, 4:66-5:4; EX2070, ¶169. By contrast, Goossens2002 is directed to a NoC and teaches that components involved in communication must be decoupled from computational components. EX1005, 1; EX2070, ¶180. Given these differences, a POSITA would not look to Drake to fill in the details in Goossens2002. EX2070, ¶¶173-174, 180.

c. Claim 6

Petitioner fails to establish the requisite motivation to combine Goossens2002 and Drake to meet claim 6. The Petition's analysis for claim 6 contains no references to Petition Section VII.A.1, and only two cites to Goossens2002, neither of which

explains why or how Goossens2002 would be modified or work with Drake's teachings. *See* Pet., 39-44.

Limitation 6[a]—The first module must issue a “request (REQ) for a connection” to “said communication manager.” Petitioner relies on Goossens2002's IP and Drake's source station 10, and the respective requests issued therefrom, for the claimed “first module” and “request,” and relies on Drake's QoS requestor manager 12 as the claimed “communication manager.” Pet., 40-41. The Petition, however, contains no discussion for why or how Goossens2002 and Drake would be combined to meet limitation 6[a]. *See* Pet., 40-41. Petitioner's expert declaration is similarly insufficient. EX1003, ¶¶128-30.

As explained above for claim 2, there is no need for Drake's QoS requestor manager in Goossens2002. *Supra*, §VI.B.2.b. For limitation 6[a], the Petition asserts that both Goossens2002 and Drake “[s]imilarly” describe an alleged first module that requests a connection—i.e., Goossens2002's IP makes a “service request” to set up a connection and an application in Drake's source station similarly “requests a ... connection.” Pet., 40. But the Petition then asserts that “Drake ***further*** describes that the application in the source station ... communicates this request ***to a QoS requestor manager ... for subsequent transmission to a QoS allocator.***” Pet., 41 (emphasis added). The Petition provides no motivation for incorporating this

“further” step into Goossens2002—i.e., to modify Goossens2002 such that its IP issues a request to a QoS requestor manager for subsequent transmission. Pet., 41.

A POSITA would have no reason to incorporate this “further” step into Goossens2002 because if Drake's QoS allocator was implemented in Goossens2002 as Petitioner alleges, then a POSITA considering the combination would have understood that Goossens2002's IP would just send its request directly to the QoS allocator, not “to a QoS requestor manager ... for subsequent transmission to [the] QoS allocator” as Petitioner asserts. Pet., 41; EX2070, ¶¶192-195. It would have been redundant and unnecessary for a request issued by Goossens2002's IP to be sent to and issued *again* by a QoS requestor manager. EX2070, ¶194; *South-Tek*, 748 Fed. App'x at 1006; *Anova*, 809 Fed. App'x at 843.

Moreover, because limitation 6[a] recites that the “first module” issues a “request” to the “communication manager,” this implicates the issues discussed above for claim 2 regarding where and how Drake's QoS requestor manager is purportedly implemented in Goossens2002. *Supra*, §VI.B.2.b. Petitioner failed to sufficiently explain how Drake's QoS requestor manager is implemented in Goossens2002 (e.g., in Goossens2002's IP, NOS, or elsewhere). *Id.* As discussed above, this matters because Goossens2002 and Drake contain contradictory teachings with respect to where communication components should be implemented relative to a network. *Id.*

Limitation 6[b]-[d]—Limitations 6[b]-[d] recite that “said communication manager (CM) is adapted to forward said request (REQ) ... to said resource manager (RM),” and “said resource manager (RM) responding ... to said communication manager (CM)” “with the availability of the requested connection,” “wherein a connection between the first and second module is established based on the available properties.” Petitioner relies on Drake’s teachings for limitation 6[b]-[d], asserting that Drake’s QoS requestor manager (alleged “communication manager”) sends a QoS request (alleged “request”) to the QoS allocator (alleged “resource manager”), the QoS allocator then sends a QoS allocation reply (alleged “respon[se]”), and a connection is established between source and target stations (alleged “first and second module”). Pet., 41-44.

The Petition, however, fails to establish the requisite motivation for limitations 6[b]-[d], as Petitioner’s analysis of limitations 6[b]-[d] contains no discussion or citation of Goossens2002, much less an explanation for why and how Goossens2002 would be modified to include the relied-upon teachings of Drake. Pet., 41-44. For example, for limitation 6[b], the Petition does not establish why Goossens2002 would have been modified to include Drake’s QoS requestor manager to forward a request to the alleged “resource manager” (i.e., Drake’s QoS allocator), as opposed to the request just being sent directly to the alleged “resource manager” by Goossens2002’s IP. Pet., 41-42; *see also id.*, 40 (acknowledging that

Goossens2002's IP makes a service request similar to Drake's QoS request). For limitation 6[c], the Petition does not establish why Goossens2002 would have been modified such that the alleged "resource manager" sends a response relating to availability to a QoS requestor manager purportedly incorporated from Drake, as opposed to this response being sent directly to the IP that made the request. Pet., 42-43. In fact, Petitioner's 6[c] analysis does not even mention Drake's QoS requestor manager. *Id.*

If a POSITA was looking to implement Drake's QoS system in Goossens2002, they would have understood that the alleged "resource manager" (i.e., Drake's QoS allocator) would have received the request directly from, and provided its response to, Goossens2002's IP, not a QoS requestor manager. EX1006, 4:50-52 ("[QoS] allocator 20 ... receive[s] the QoS request from [source] station 10"), 11:22-38, 14:22-27; Pet., 34 (admitting that "a requesting module"—like Goossens2002's IP—"sends a request to [Drake's] [QoS] allocator 26"), 26-27, 31-32, 40 (associating Goossens2002's IP with Drake's source station 10); *see also* EX2078, 131:13-132:12, 199:6-14, 228:18-229:8, 198:7-22, 152:1-12, 153:11-18, 173:8-11, 199:15-18 (admitting that Goossens2002's IP already sends such requests and Drake's QoS allocator receives such requests from, and sends replies to, a first module such as Goossens2002's IP); EX2070, ¶¶196-199.

d. Claim 10

Petitioner relies on its analysis of limitations 6[a], 6[b], 1[g], 6[c], and 6[d] for limitations 10[a]-10[e]. Pet., 46-47. Accordingly, Petitioner did not meet its burden for claim 10 for at least the same reasons as for claim 6. EX2070, ¶200. Additionally, 10[a]-[b] recite a “communication manager” and “resource manager,” so Petitioner failed to meet its burden for these limitations for at least the same reasons explained above with respect to claim 2 and limitation 1[c].

3. The Alleged Combination of Goossens2002 and Drake Does Not Meet the Claim Limitations Regarding the “Communication Manager” and “Resource Manager”

Even if a POSITA would have been motivated to combine Goossens2002 and Drake (which they would not have), the alleged combination still fails to disclose multiple claim limitations. EX2070, ¶¶211-231.

a. Goossens2002 and Drake Do Not Disclose the Claimed Communication Manager

The Goossens2002/Drake combination fails to teach the “communication manager” recited in claim 2 and limitation 10[a]. EX1001, 18:49-51, 19:33; EX2070, ¶212. Petitioner relies on Drake's QoS requestor manager 12 as the claimed “communication manager.” Pet., 35-38, 40-41, 46-47. However, as the Board found in the Institution Decision, Petitioner relies on Drake's source station 10 for the claimed “first module,” and QoS requestor manager 12 is completely within source station 10. EX1006, Fig. 1, 4:32-34, 4:62-65. QoS requestor manager 12 cannot

constitute the “communication manager” because, properly construed, the “communication manager” cannot be within the “first module.” *Supra*, §V.A.

Additionally, Petitioner made no attempt to analyze the claimed communication manager under a §112 ¶6 claim construction, including the two previous district court constructions. *Supra*, §V.B. Instead, Petitioner only mentioned this possibility in a footnote, and its expert offered no opinions on whether the references meet the §112 ¶6 claim construction. *See* Pet., 16 n.3; EX1003, ¶¶117-122; 37 C.F.R. § 42.104(b)(3).

b. 6[a] and 10[a]: First Module Issues a Request for a Connection With the Second Module to a Communication Manager

Petitioner's Goossens2002/Drake combination fails to meet limitations 6[a] and 10[a], which recite that a “first module [...] issue[s] a request [] for a connection with [said] second module[] to [said] communication manager.” EX1001, 18:60-63, 19:32-33; EX2070, ¶¶213-218. As explained above, Petitioner relies on Drake's source station 10 and QoS requestor 12 for the claimed “first module” and “communication manager,” respectively. Pet., 40-41, 46-47. Drake does not teach that *source station 10* (alleged “first module”) *issues a request to* QoS requestor manager 12 (alleged “communication manager”) as required for limitations 6[a] and 10[a]. EX2070, ¶213.

In Drake, the request to QoS requestor manager 12 is issued by application 11, not source station 10. EX1006, Fig. 1, 4:18-37, 4:62-65; EX2070, ¶214. Petitioner does not and cannot show that Drake teaches QoS requestor manager 12 receiving a request from anywhere in source station 10 other than from application 11. Indeed, in Petitioner's only mentions of QoS requestor manager 12 for limitation 6[a], Petitioner admits that "*the application [11]* ... communicates this request to a QoS requestor manager" and "[t]he QoS requestor manager 12 interacts with *application [11]*." Pet., 40-41 (quoting EX1006, 4:62-65) (emphases added).

A POSITA would have at least understood Drake's teachings from the same level for both issuing and receiving the request. That is, to the extent the request is considered to be issued by source station 10 (alleged "first module") rather than application 11 therein, then the request would likewise be understood to be received by the source station 10, not QoS requestor manager 12 (alleged "communication manager") therein. EX2070, ¶216. On the other hand, to the extent the request is considered to be received by QoS requestor manager 12, not source station 10 as a whole, then the request would likewise be understood to be issued by application 11, not source station 10 (alleged "first module") as a whole. *Id.* The Board should reject Petitioner's warped reading of Drake—i.e., that the request is issued by the entire source station and received by a component thereof.

The Board's Institution Decision found: "As for Patent Owner's assertion that source station 10 as the claimed 'first module' cannot 'issue a request' to itself, the challenged claims do not specify what component in the 'first module' issues a request to the claimed 'communication manager.'" IPR2024-01081, Paper 14 at 25. However, as explained above, a POSITA would have understood that the claimed "communication manager" cannot be completely within the "first module," including because the "first module" would not issue a request to itself. *Supra*, §V.A.

c. 6[b] and 10[b]: Communication Manager Forwards the Request to a Resource Manager

Petitioner's Goossens2002/Drake combination fails to meet limitations 6[b] and 10[b], which recite "[said] communication manager ... forward[s] [said] request ... to [a] resource manager." EX1001, 18:63-67, 19:36-37; EX2070, ¶¶219-224. Drake does not teach that QoS requestor manager 12 (alleged "communication manager") forwards the request it receives to QoS allocator 20 (alleged "resource manager") as required for limitations 6[b] and 10[b]. EX2070, ¶219.

A POSITA would not have understood that Drake's QoS requestor manager 12 forwards a request to QoS allocator 20. EX2070, ¶220. Drake teaches that the request received by QoS allocator 20 is sent from source station 10, not from QoS requestor manager 12 therein. EX1006, Fig. 1, 4:50-54 ("allocator 20 ... receive[s] the QoS request from station 10"), 5:5-8 ("Allocator station 20 ... receives ... the QoS request from source station 10"), 9:52-10:8 ("included in the allocation request

message” is “the source address field 52 (Source MAC Address)” “of the source ... station[]”), Fig. 3, 10:41-46 (“source station 10 actually sends a request to the allocator [20]), Fig. 4; Paper 10, 35-36, 39; EX2070, ¶220.

Drake teaches that QoS requestor manager 12, along with QoS protocol machine 13, merely “assemble[s]” and “format[s]” a request and sends it to transport protocol stack 15, not that QoS requestor manager 12 actually forwards sends the request to QoS allocator 20. EX1006, 4:32-37, 4:62-65, Fig. 1; Paper 14, 34-35; EX2070, ¶221. After QoS requestor manager 12 assembles/formats the request, source station 10 uses transport protocol stack 15 and MAC entity 16 for formatting and launching on LAN 17, respectively, a request packet for sending the request to QoS allocator 20. EX1006, 4:37-40, Fig. 1; Paper 14, 35; EX2070, ¶221. If any particular component(s) of source station 10 send or forward the request to allocator 20, it would be transport protocol stack 15 and/or MAC entity 16 – not QoS requestor manager 12. The mere fact that the request is *eventually* received by QoS allocator 20 does not mean that QoS requestor manager 12 forwards the request to QoS allocator 20. EX2070, ¶222.

d. 6[c] and 10[d]: Resource Manager Responding to the Communication Manager

Petitioner's Goossens2002/Drake combination fails to meet limitations 6[c] and 10[d], which recite “[said] resource manager [] responding with the availability of the [target] connection to [said] communication manager.” EX1001, 18:67-19:2,

20:1-2; EX2070, ¶225-229. Petitioner relies on Drake's QoS allocator 20 and QoS requestor manager 12 and for the claimed "resource manager" and "communication manager," respectively, and relies on Drake's QoS allocation reply for the claimed "respon[se]." Pet., 41-43, 47. Drake does not teach that QoS allocator 20 (alleged "resource manager") sends the QoS allocation reply (alleged "respon[se]") to QoS requestor manager 12 (alleged "communication manager"); EX2070, ¶225.

First, Drake does not disclose that allocator 20 sends the QoS allocation reply to QoS requestor manager 12 (alleged "communication manager"). EX2070, ¶226. Instead, Drake teaches that QoS allocator 20 sends the QoS allocation reply to source station 10. EX1006, 4:54-57 ("station 10 is notified"), 8:20-29 (describing "QoS allocation reply" as a "message[] exchanged between the stations of the [LAN]"), 14:22-27 ("AllocationReply message is ... sent from allocator station 20 ... to source station 10," and "source station 10 ... receives the AllocationReply message"), 11:22-48 (describing that allocation acceptance/denial messages in Fig. 5 are sent to, and received by, "source station 10"), 9:52-10:2 (describing a "QoS message," such as QoS allocation reply, as including a "source address field 52 (Source MAC Address)" for the source station); EX2078, 153:11-18; EX2070, ¶226. As for QoS requestor manager 12, Drake merely discloses that it assembles/formats the QoS request, not that it receives any response. EX1006, 4:32-37, 4:62-65; EX2070, ¶226.

Second, it is neither inherent nor obvious that QoS allocator 20 sends the QoS allocation reply to QoS requestor manager 12. A POSITA would have understood that the QoS allocation reply would not have necessarily been sent to QoS requestor manager 12; instead, the reply would be sent to application 11 because it is the original requestor. EX1006, 4:27-32 (disclosing “application 11 ... requests a QoS connection to the ... target station 29”), 11:22-28 (describing that an “allocation acceptance message” is sent to source station 10 and then “the multimedia file is transmitted to the target station 29”); EX2070, ¶227. A POSITA would have understood that if the QoS allocation reply is sent to application 11 via the path shown by Drake's Figure 1 this would not constitute QoS allocator 20 “responding ... to” QoS requestor manager 12 as recited by the claims. EX2070, ¶227.

Lastly, Petitioner fails to establish that these limitations are disclosed or obvious over Drake. Critically, there is no mention of QoS requestor manager 12 in Petitioner's 6[c] analysis, the portions of Drake cited therein, or the corresponding portion of Petitioner's expert declaration, much less any argument or showing that Drake discloses or even renders obvious that QoS allocator 20 sends the QoS allocation reply to QoS requestor manager 12. Pet., 42-43 (citing EX1006, 4:55-57, 8:20-29, 8:50-64, Fig. 5); EX1003 ¶133; EX2070, ¶228. In fact, the cited portions of Drake disclose that the QoS allocation reply is sent to source station 10. EX1006, 4:55-57, 8:20-29; EX2070, ¶228. Petitioner's expert admitted the same. EX2078,

153:7-18. Petitioner presents no argument or evidence that Drake meets this limitation. *See* Pet., 42-43.

e. 6[d] and 10[e]: Connection Between the First and Second Module is Established

To the extent that Petitioner relies on Drake's application 11 as the claimed "first module," then Petitioner's Goossens2002/Drake combination fails to meet limitations 6[d] and 10[e], which recite, in part, "[the target] connection between the first and second module [is] established." EX1001, 19:2-5, 20:4-6; EX2070, ¶230-231. Neither Petitioner's analysis for limitations 6[d]/10[e] nor the corresponding portions of its expert declaration mention Drake's application 11, much less include argument or evidence that a "connection between" application 11 and Drake's target station 29 (alleged "second module") "[is] established," as recited by these limitations. *See* Pet., 43-44, 47; EX1003 ¶134; *see also* EX2078, 62:3-7, 171:21-172:4 (admitting Drake's "connection [is] between the source station and the destination station").

C. Petitioner Failed to Meet its Burden for Ground 2

Petitioner failed to establish that Goossens2003 and Drake renders obvious any of claims 2, 6, and 9-16. Petitioner relies on Goossens2003 for the claimed "[i]ntegrated circuit comprising ... [a] network." Pet., 54-57, 68-69. Petitioner admits that Goossens2003 does not teach the claimed "communication manager" or "resource manager" and relies on Drake's QoS requestor manager 12 and QoS

allocator 20 for those claim elements. Pet., 57-58, 61-63, 65-67, 69-70. Petitioner alleges that those components would have been incorporated into Goossens2003. Pet., 57-58, 61-63, 65-67, 69-70.

Petitioner failed to meet its burden for Ground 2 because (1) a POSITA would not have combined Goossens2003 and Drake and (2) the alleged Goossens2003 and Drake combination fails to meet the “communication manager” and “resource manager” limitations.

1. A POSITA Would Not Have Combined Goossens2003 and Drake to Meet the “Communication Manager” and “Resource Manager” Limitations

Similar to Ground 1, the Petition argues that select components and functions of Drake's QoS management system would be implemented in Goossens2003, but Petitioner fails to explain specifically *why* and *how* those aspects of Drake's QoS system would purportedly be incorporated into and work with Goossens2003. Regardless, as with Ground 1, there is no motivation for Petitioner's purported combination for Ground 2, including because of redundancy and teaching away. EX2070, ¶¶236-276.

a. Petitioner's Motivation to Combine Arguments are Generic and Untethered to Specific Claim Limitations

The entirety of Petitioner's argument as to why a POSITA would allegedly combine Goossens2003 and Drake is confined to Section VII.A.1 of the Petition. Pet., 51-54 (“Petition Section VII.B.1”), 58. Petition Section VII.B.1, however,

merely asserts that a POSITA “would have looked to Drake’s disclosure of a ‘QoS requestor manager’ to formulate requests for guaranteed services with particular properties and a ‘QoS allocator’ to determine whether the network resources required for the requested services are available,” with no explanation as to how Drake’s teachings would work with Goossens2003 (e.g., IPs, NOC, and existing service requests). Pet., 51-52. For example, Petitioner does not explain why *two* QoS components from Drake are purportedly needed for resource management in Goossens2003 rather than a single component, or why a POSITA would have purportedly “looked to Drake’s disclosure of a ‘QoS requestor manager’ to formulate requests for guaranteed services with particular properties” when Goossens2003 purportedly already teaches such requests. Pet., 51-52, 65. Petitioner’s expert fares no better. EX1003, ¶¶156-166.

Petitioner’s failure to explain how Goossens2003 and Drake would work together or tie its alleged motivation to combine to specific limitations is fatal to Ground 2. *See, e.g., ActiveVideo*, 694 F.3d at 1327-28; *Braintree*, 749 F.3d at 1359; *PersonalWeb*, 848 F.3d at 993-94; *Juniper*, IPR2021-01356, Paper 27 at 48-50; *NuVasive*, 842 F.3d at 1381-82.

b. Claim 2

Communication Manager—Petitioner concedes that Goossens2003 does not disclose the claimed “communication manager,” but it is unclear whether Petitioner

maps the “communication manager” to Goossens2003’s NI, Drake’s QoS requestor manager 12, or some combination of both. Pet., 62-63, 52.⁷ Petitioner fails to establish motivation due to this lack of clarity alone. Petitioner also fails to establish motivation with respect to either Goossens2003’s NI or Drake’s QoS requestor manager 12 for the following reasons.

Communication Manager: Goossens2003’s NI—To the extent that Petitioner relies on Goossens2003’s NI—either alone or in combination with Drake’s QoS requestor manager—for the “communication manager,” Petitioner provides no explanation for why or how Goossens2003’s NI would work together with any aspects of Drake, such as QoS requestor manager or QoS allocator. Pet., 62-63. Petitioner’s claim 2 analysis each reference separately and refers to its Ground 1 analysis and Petition Section VII.B.1, neither of which mentions Goossens2003’s NI. Pet., 62-63 (citing Pet. 35-38, 51-54). In fact, Petition Section VII.B.1 suggests that Goossens2003 does ***not*** include the claimed “communication manager” and that a POSITA would incorporate Drake’s QoS requestor manager instead. Pet., 51-52.

⁷ Petitioner disavowed any reliance on Drake’s QoS requestor manager 23 for the claimed “communication manager.” Pet., 37 n.7, 63; Paper 10, 55-56, 78-79.

Communication Manager: Drake's QoS requestor manager 12—

Petitioner's only alleged motivation for incorporating Drake's QoS requestor manager into Goossens2003 is that "a POSITA would have looked to Drake's disclosures regarding a QoS requestor manager to obtain the benefits of Drake's known solution to ensuring the availability of network resources for guaranteed services." Pet., 62-63 (citing Petition Section VII.B.1). But neither this statement nor Petition Section VII.B.1 explains *why* a POSITA would implement Drake's QoS requestor manager in Goossens2003 or *how* it would work with Goossens2003. *See* Pet., 62-63, 51-54. Petitioner's expert fares no better. EX1003, ¶¶184-87.

A POSITA would not have been motivated to incorporate Drake's QoS requestor manager into Goossens2003 because it would be redundant. EX2070, ¶¶252-265. Petitioner refers to its Ground 1 analysis, which asserts that Drake's QoS requestor manager requests a QoS connection. Pet., 35, 63. However, Goossens2003's IP already does this, as the Petition recognizes: "Goossens2003's master IPs ... issue requests for connections" and "the requests issued by the IPs comprise desired connection properties." Pet., 65; EX2070, ¶254. That is, both Drake's QoS requestor manager and Goossens2003's IP both purportedly make a request for a connection with sufficient properties. EX1006, 4:32-37; EX1007, 77, 67, 71; Pet., 35, 63, 65; EX2078, 190:19-191:14; EX2070, ¶254. While Petitioner asserts that Drake's QoS requestor manager communicates with the alleged

“resource manager” (i.e., Drake’s QoS allocator), a POSITA would have understood that this could be done by Goossens2003’s IP, such that there is no need to add an additional component. Pet., 35, 63; EX2078, 152:1-12, 173:8-11, 201:1-5; EX2070, ¶254.

A POSITA would have no reason to add Drake’s QoS requestor manager in Goossens2003 because Goossens2003’s IP can already generate a connection request and send it to the alleged “resource manager” without Drake’s QoS requestor manager. EX2070, ¶254; *South-Tek*, 748 Fed. App’x at 1006 (finding no motivation due to redundancy); *Anova*, 809 Fed. App’x at 843 (same); *Kinetic*, 688 F.3d at 1369 (similar).

Further, to the extent Petitioner is suggesting that a POSITA would be motivated to modify Goossens2003 with Drake to achieve the benefit of “ensuring the availability of network resources for guaranteed services,” that argument is flawed because Goossens2003 already describes this. Pet., 51-53, 63; *see, e.g.*, EX1007, Abstract (referring to “introducing guaranteed services”), 5, 10-11, 18-19. A POSITA would not have motivated to modify Goossens2003 to purportedly obtain a benefit that is already achieved by Goossens2003. *South-Tek*, 748 Fed. App’x at 1006; *Anova*, 809 Fed. App’x at 843.

Another fundamental problem with the Petition is that, similar to Ground 1, it fails to specify *where* Drake’s QoS requestor manager 12 would be implemented in

Goossens2003. Pet., 51-54, 62-63. This matters because Goossens2003 teaches that components involved in communication, like Drake's QoS requestor manager, should **not** be implemented in an IP block, whereas Drake teaches that the QoS requestor manager should **not** be implemented in a network. In other words, consistent with the reality that on-chip and off-chip networks have different premises (*supra* §II.C), Goossens2003 and Drake teach completely opposite solutions. Drake is premised on its QoS components being implemented in stations attached to networks, so that the network stays the same, whereas Goossens2003 is premised on implementing such communication components within the network, so that the IPs stay the same. EX1006, Abstract ("management system is attached to the network"), Fig. 1, 4:18-26, 4:32-47, 4:62-67, 14:17; EX1007, 65-66, 78 (regarding "decoupling" and IP "re-use"); EX2078, 138:5-11, 140:1-141:7, 142:21-143:7, 150:8-151:21, 189:1-190:3.

Goossens2003 is emphatic that its IPs should **not** contain communication components like Drake's QoS requestor manager, and this is important so that IP blocks can be reused and designed independently from the network. EX1007, 65 ("We advocate system design centered on NOCs and QoS" because: "IP re-use and platform-based design aim to re-use applications and architectures by decoupling them. The use of NOCs and their associated network protocol stacks are a way to achieve this."), 66 ("NOCs help IP re-use and platform-based design to combine IPs,

and NOC services aid in decoupling applications and architectures.”), 78; EX2078, 189:1-190:3. A POSITA therefore would not modify Goossens2003 to include the QoS requestor manager 12 in an IP block because Goossens2003 teaches away from doing so. *DePuy*, 567 F.3d at 1327.

On the other hand, as explained above for Ground 1, Drake's QoS requestor manager is purposefully within source station 10 rather than within the LAN. *See* §VI.B.2.b, *supra*. A POSITA would not modify Goossens2003 to include Drake's QoS requestor manager in the NOC because Drake expressly teaches away from positioning the QoS requestor manager within a network. EX2070, ¶255. Moreover, under Petitioner's proposed definition, it would not be within the routine skill for a POSITA to implement Drake's QoS requestor manager in Goossens2003's NOC. EX2070, ¶264. Drake teaches that it would be complex to implement QoS in the network. EX1006, 2:57-3:3. It would be more complex to implement the QoS requestor manager in the Goossens2003 NOC than the LAN in Drake. EX2070, ¶264. A POSITA under Petitioner's definition would not have a reasonable expectation of success in combining Goossens2003 and Drake in this manner. EX2070, ¶264.

The Institution Decision found that Petitioner's proposed modification does not “modify[] Goossens2003's IP block to include Drake's requestor manager 12” because “Petitioner proposes implementing Drake's QoS management process in

[Goossens2003's] NoC, not modifying an IP block.” Paper 10, 85 (citing Samsung Pet., 48-51, corresponding to Pet., 51-54). It is true that the Petition does not expressly say that Goossens2003's IP block would be modified. *See* Pet., 51-54. But it is equally true that the Petition does not expressly say that Drake's requestor manager 12 would be implemented in Goossens2003's NOS. *See* Pet., 51-54. That is the problem.

Patent Owner sought to clarify this ambiguity during Dr. Mowry's deposition. Dr. Mowry was evasive as to where Drake's QoS requestor manager would be implemented in Goossens2003 but eventually testified Drake's QoS requestor manager can go “*anywhere* on the chip” in Goossens2003 as long as it is “[attached or connected] to the [NOC].” EX2078, 209:22-211:25, 233:4-234:1 (emphasis added); *see also id.*, 203:10-209:13 (confusing Drake's QoS requestor manager with Drake's “centralized” QoS allocator relied upon for the claimed “resource manager,” and also relying on hindsight from the '449 patent). This opinion is not in his declaration, ignores the teachings of Goossens2003 and Drake (discussed above), and contradicts the Institution Decision's interpretation (noted above) of the Petition.

Petitioner and Dr. Mowry's analysis apparently contemplates implementing Drake's requestor manager 12 in Goossens2003 *outside* of the NOC. A POSITA would not make such a modification to Goossens2003 for several reasons. First, as taught in the '449 Patent, unlike Drake's off-chip network, Goossens2003's NoC is

resource constrained, and it is not feasible to add dedicated hardware due to space constraints. EX1001, 2:3-46; EX2070, ¶¶240, 263. Adding Drake's QoS requestor manager 12 as a separate component on Goossens2003's NoC would undesirably increase the form factor of the IC and/or limit space for other components. EX2070, ¶¶240, 263. It would also increase the circuit component count and manufacturing complexity. EX2070, ¶¶240, 26. Further, implementing the QoS requestor manager 12 as separate component connected to the NOC would introduce additional latency each time an IP block needed to communicate with it. EX2070, ¶188.

Resource Manager—Limitations 1[c] and 1[g] relate to the claimed “resource manager.” Petitioner's analysis contains no discussion whatsoever as to *why or how* a POSITA would modify Goossens2003 to meet these limitations. Pet., 57-58 (1[c]), 61-62 (1[g]). For example, Petitioner does not explain where Drake's QoS allocator would purportedly receive requests from in the alleged combination with Goossens2003 (e.g., from Goossens2003's IP or somewhere else). Pet., 61-62. Petitioner's expert fares no better. EX1003, ¶¶173, 182-83.

Additionally, Petitioner's argument that a POSITA would look to Drake to fill in the missing details from Goossens2003, including the missing resource and communication managers, ignores the fundamentally different architectures in these references. Pet., 52-53, 58, 62; *supra*, §II.C (explaining the different premises of on and off chip networks). Drake's QoS management is specifically directed to local

area networks (LANs). EX1006, Abstract, 1:6-11, 1:13-2:21, 2:25-3:29, 3:31-4:10, 15:39-46; EX2070, ¶¶242-243. As discussed above, Drake teaches that the QoS management components are attached to, but not implemented within, the network. EX1006, 4:18-26, 4:32-47, 4:62-65, 4:66-5:4; EX2070, ¶255. By contrast, Goossens2003 is directed to a NoC and teaches that components involved in communication must be decoupled from computational components. EX1007, 65-66; EX2070, ¶255. Given these differences, a POSITA would not look to Drake to fill in the details in Goossens2003. EX2070, ¶255.

c. Claim 6

Petitioner fails to establish the requisite motivation to combine Goossens2003 and Drake to meet claim 6. EX2070, ¶¶266-275. The Petition's analysis for claim 6 contains no references to Petition Section VII.B.1, and only four cites to Goossens2003, none of which explain why or how Goossens2003 would be modified or work with Drake's teachings. *See* Pet., 65-67.

Limitation 6[a]— The first module must issue a “request (REQ) for a connection” to “said communication manager.” Petitioner relies on Goossens2003's IP and Drake's source station 10, and the respective requests issued therefrom, for the claimed “first module” and “request,” and relies on Drake's QoS requestor

manager 12 as the claimed “communication manager.”⁸ Pet., 65-66. The Petition, however, contains no discussion for why or how Goossens2003 and Drake would be combined to meet limitation 6[a]. *See* Pet., 65-66. Petitioner's expert declaration is similarly insufficient. EX1003, ¶¶193-95.

As explained above for claim 2 there is no need for Drake's QoS requestor manager in Goossens2003. *Supra*, § VI.C.1.b. For limitation 6[a], the Petition asserts that both Goossens2003 and Drake “[s]imilarly” describe an alleged first module that requests a connection—i.e., Goossens2003's master IP “issue[s] requests for connections” and an application in Drake's source station similarly “requests a ... connection.” Pet., 65. But the Petition further asserts that Drake's source station “directs these requests *to a ‘QoS requestor manager.’*” Pet., 65-66 (emphasis added). The Petition provides no motivation for incorporating this further step into

⁸ Since Petitioner relies solely on Drake's QoS requestor manager for the “communication manager” in limitations 6[b]-6[c], 10[b], and 10[d], it is assumed this position applies to claims 6 and 10, even though, as explained above, it is unclear whether Petitioner relies on Goossens2003's NI, Drake's QoS requestor manager, or both for the “communication manager” in limitations 6[a] and 10[a] and underlying claim 2.

Goossens2003—i.e., to modify Goossens2003 such that its IP issues a request to a QoS requestor manager. Pet., 65-66.

A POSITA would have no reason to incorporate this further step into Goossens2003. EX2070, ¶269. The Petition references its 6[a] analysis in Ground 1, which describes that Drake's "application in the source station ... communicates th[e] request to a QoS requestor manager ... *for subsequent transmission to a QoS allocator.*" Pet., 41 (emphasis added), 65-66. But if Drake's QoS allocator was implemented in Goossens2003 as Petitioner alleges, then a POSITA considering the combination would have understood that Goossens2003's IP would just send its request directly to the QoS allocator, not to a QoS requestor manager "for subsequent transmission to [the] QoS allocator" as Petitioner suggests. Pet., 41, 65-66; EX2070, ¶269. It would have been redundant and unnecessary for a request issued by Goossens2003's IP to be sent to and issued *again* by a QoS requestor manager. *South-Tek*, 748 Fed. App'x at 1006; *Anova*, 809 Fed. App'x at 843; EX2070, ¶269.

Moreover, because limitation 6[a] recites that the "first module" issues a "request" to the "communication manager," this implicates the issues discussed above for claim 2 regarding where and how Drake's QoS requestor manager is purportedly implemented in Goossens2003. EX2070, ¶270. Petitioner failed to sufficiently explain how Drake's QoS requestor manager is implemented in Goossens2003 (e.g., in Goossens2003's IP, NOC, or elsewhere). *Supra*, §VI.C.1.b.

As discussed above, this matters because Goossens2003 and Drake contain contradictory teachings with respect to where communication components should be implemented relative to a network. *Id.*

Limitation 6[b]-[d]—Limitations 6[b]-[d] recite that “said communication manager (CM) is adapted to forward said request (REQ) ... to said resource manager (RM),” and “said resource manager (RM) responding ... to said communication manager (CM)” “with the availability of the requested connection,” “wherein a connection between the first and second module is established based on the available properties.” EX2070, ¶271. Petitioner relies on Drake’s teachings for limitation 6[b]-[d], asserting that Drake’s QoS requestor manager (alleged “communication manager”) sends a QoS request (alleged “request”) to the QoS allocator (alleged “resource manager”), the QoS allocator then sends a QoS allocation reply (alleged “respon[se]”), and a connection is established between source and target stations (alleged “first and second module”). Pet., 66-67 (referencing Pet., 41-44).

The Petition, however, fails to establish the requisite motivation for limitations 6[b]-[d], as Petitioner’s analysis of limitations 6[b]-[d] contains no explanation for why and how Goossens2003 would be modified to include the relied-upon teachings of Drake. Pet., 66-67. For example, Petitioner’s 6[b] analysis contains no explanation for why or how Goossens2003 would be modified to include Drake’s QoS requestor manager to forward a request to the alleged “resource

manager” (i.e., Drake’s QoS allocator), as opposed to the request just being sent directly to the alleged “resource manager” by Goossens2003’s IP. Pet., 66; *see also* Pet., 65 (acknowledging that Goossens2003’s IP makes a service request similar to Drake’s QoS request). For limitation 6[c], the Petition contains no discussion or citation of Goossens2003 at all, much less explanation for why or how Goossens2003 would have been modified such that the alleged “resource manager” sends a response about availability to a QoS requestor manager purportedly incorporated from Drake, as opposed to this response being sent to the IP that made the request. Pet., 66. Petitioner’s 6[c] analysis does not even establish that such response is sent to the QoS requestor manager in Drake itself, and as explained below in section VI.C.2.d, Drake does not teach this. *Id.* (citing only EX1003 ¶197, which cites no support, and Petition section VII.A.7.d, which does not even mention Drake’s QoS requestor manager).

If a POSITA was looking to implement Drake’s QoS system in Goossens2003, they would have understood that the alleged “resource manager” (i.e., Drake’s QoS allocator) would have received the request directly from, and provided its response to, Goossens2003’s IP, not a QoS requestor manager. EX1006, 4:50-52 (“[QoS] allocator 20 ... receive[s] the QoS request from [source] station 10”), 11:22-38, 14:22-27; Pet., 34 (admitting that “a requesting module”—like Goossens2003’s IP—“sends a request to [Drake’s] [QoS] allocator 26”), 59, 26-

27, 61, 31-32 (associating Goossens2003's IP with Drake's source station); *see also* EX2078, 190:19-191:14, 152:1-12, 153:11-18, 173:8-11, 201:1-5 (admitting that Goossens2003's IP already sends such requests and that Drake's QoS allocator (alleged "resource manager") receives requests from and sends replies to Drake's source station (associated with Goossens2003's IP)); EX2070, ¶273.

d. Claim 10

Petitioner relies on its analysis of limitations 6[a], 6[b], 1[g], 6[c], and 6[d] for limitations 10[a]-[e]. Pet., 69-70. Accordingly, Petitioner did not meet its burden for claim 10 for at least the same reasons as for claim 6. EX2070, ¶276. Additionally, limitations 10[a]-[b] recite a "communication manager" and "resource manager," so Petitioner failed to meet its burden for these limitations for at least the same reasons explained above with respect to claim 2 and limitation 1[c].

2. The Alleged Combination of Goossens2003 and Drake Does Not Meet the Claim Limitations Regarding the "Communication Manager" and "Resource Manager"

Petitioner's Goossens2003/Drake combination does not meet the limitations of claims 2, 6, and 10. EX2070, ¶¶277-297.

a. Goossens2003 and Drake Do Not Disclose the Claimed Communication Manager

Petitioner's Goossens2003/Drake combination fails to teach the "communication manager" recited first in claim 2 and limitation 10[a]. EX1001, 18:49-51, 19:33; EX2070, ¶¶278-279. Like Ground 1, Petitioner relies on Drake's

QoS requestor manager 12 as the claimed “communication manager,” even though, as the Board found in the Institution Decision, the Petition relies on the entire source station 10 as the first module. Pet., 62-63, 65-66, 69, 52; *supra*, §VI.B.3.a. QoS requestor manager 12 cannot correspond to the communication manager because it is completely within source station 10. *Supra*, § VI.B.3.a; EX2070, ¶278. Additionally, as discussed above for Ground 1, Petitioner made no attempt to show that Drake's QoS requestor manager 12 meets the district court §112, ¶6 construction of “communication manager.” *Supra*, §VI.B.3.a.

Unlike in Ground 1 where Petitioner only relies on Drake, Petitioner argues in Ground 2 that Goossens2003's NI is a communication manager. Pet., 62-63. There are three problems with this assertion. First, the claims require that the communication manager communicate with the resource manager, but Petitioner admits that Goossens2003 does not disclose a resource manager. *See, e.g.*, Pet., 66; EX2078, 193:10-197:17. Second, Petitioner's argument is predicated on Patent Owner's proposed district court claim construction, even though it was not adopted by the court. Pet., 62-63; EX1003, ¶186; EX2078, 192:15-19. Third, the claims recite the “communication manager” and “network interface means” as separate elements. EX1001, 18:49-51, 19:17-20; *Becton*, 616 F.3d at 1254. Petitioner makes no attempt to explain how the same element can be both the “network interface” and “communication manager.”

b. 6[a] and 10[a]: First Module Issues a Request for a Connection With the Second Module to a Communication Manager

Petitioner's Goossens2003/Drake combination fails to meet limitations 6[a] and 10[a], which recite that a "first module [...] issue[s] a request [] for a connection with [said] second module[] to [said] communication manager" for the same reasons discussed above for Ground 1. EX1001, 18:60-63, 19:32-33; EX2070, ¶¶280-285; *supra*, §VI.B.3.b. As discussed above, to the extent Petitioner is relying on Drake's source station 10 as the claimed first module (which is what the Board found in the Institution Decision), Drake does not teach that *source station 10* (alleged "first module") *issues a request to* QoS requestor manager 12 (alleged "communication manager") as required for limitations 6[a] and 10[a]. *Supra*, §VI.B.3.b.

c. 6[b] and 10[b]: Communication Manager Forwards the Request to a Resource Manager

For the same reasons discussed above for Ground 1, Petitioner's Goossens2003/Drake combination fails to meet limitations 6[b] and 10[b], which recite "[said] communication manager ... forward[s] [said] request ... to [a] resource manager." EX1001, 18:63-67, 19:36-37; EX2070, ¶¶286-291; *supra*, §VI.B.3.c. Drake does not teach that QoS requestor manager 12 (alleged "communication manager") forwards the request it receives to QoS allocator 20 (alleged "resource manager"). *Supra*, §VI.B.3.c. Petitioner does not rely on Goossens2003 to remedy the deficiencies described above in Drake. Pet., 66.

d. 6[c] and 10[d]: Resource Manager Responding to the Communication Manager

The Goossens2003/Drake combination fails to meet limitations 6[c] and 10[d] for the same reasons discussed above for Ground 1. EX1001, 18:67-19:2, 20:1-2; EX2070, ¶¶292-296; *supra*, §VI.B.3.d. This is because Drake does not teach that QoS allocator 20 (alleged “resource manager”) sends the QoS allocation reply (alleged “respon[se]”) to QoS requestor manager 12 (alleged “communication manager”). *Supra*, §VI.B.3.d.

As in Ground 1, Petitioner fails to establish that these limitations are obvious over Drake. *Supra*, §VI.B.3.d. While Petitioner's Ground 2 analysis asserts that “the QoS allocator ... sends a ‘QoS allocation reply’ to the QoS requestor manager,” the only cited support is Petitioner's Ground 1 analysis. Pet., 66. As discussed above, there is no mention of QoS requestor manager 12 (alleged “communication manager”) in Petitioner's cited 6[c] analysis for Ground 1, much less any argument or showing that Drake renders obvious that QoS allocator 20 sends the QoS allocation reply to QoS requestor manager 12. Pet., 42-43 (citing EX1006, 4:55-57, 8:20-29, 8:50-64, Fig. 5), 66; EX1003, ¶133; *supra*, §VI.B.3.d.

e. 6[d] and 10[e]: Connection Between the First and Second Module is Established

As discussed for Ground 1, to the extent that Petitioner relies on Drake's application 11 as the claimed “first module,” Petitioner failed to argue, let alone meet

its burden to show, that a “connection between” application 11 and Drake’s target station 29 (alleged “second module”) “[is] established.” *See* Pet., 67, 43-44, 70; EX1003, ¶¶198, 134; *see also* EX2078, 62:3-7, 171:21-172:4 (admitting Drake’s “connection [is] between the source station and the destination station”); EX2070, ¶297; *supra*, §VI.B.3.e.

VII. THE PETITION FAILED TO ESTABLISH THAT GOOSSENS2002 AND GOOSSENS2003 QUALIFY AS PRIOR ART

Petitioner argues that Goossens2002 “published no later than August 7, 2002” and that Goossens2003 “published no later than January 31, 2024.” Pet., 2, 8-9. The provides only blanket citations to Exhibits 1025 (“MacPherson Declaration”), 1027 (“O’Bryan Declaration”), and 1028 (“SpringerLink”) for these assertions. Pet., 10. Petitioner did not meet its burden.

The Board “may exclude or give no weight to the evidence where a party has failed to state its relevance or to identify specific portions of the evidence that support the challenge.” 37 C.F.R. § 42.104(b)(5). The petition “must include ... a detailed explanation of the significance of the evidence including material facts.” 37 C.F.R. § 42.22(a)(2). Further, “arguments must not be incorporated by reference from one document into another document.” 37 C.F.R. § 42.6(3). Petitioner’s citations to three exhibits “to support conclusory statements for which the Petition does not otherwise provide an argument or explanation” is improper. *Cisco Sys., Inc. v. C-Cation Techs., LLC*, IPR2014-00454, Paper 12 at 9 (PTAB Aug. 29, 2014)

(informative); *Medivis, Inc. v. Novarad Corp.*, IPR2023-00042, Paper 35 at 28-30 (PTAB Mar. 6, 2024) (declining to consider incorporated-by-reference declarations regarding publication). But even if considered, Petitioner's evidence does not establish that Goossens2002 and Goossens2003 were publicly accessible.

A. Petitioner's Evidence is Insufficient for Goossens2002

While Petitioner apparently suggests that Goossens2002 was available at the 2002 Design, Automation and Test in Europe Conference and Exhibition ("DATE Conference"), Petitioner presents no evidence regarding the DATE Conference. In *Power Integrations, Inc. v. Semiconductor Components Industries, LLC*, the Board found that the petitioner failed to show a conference paper was prior art because there was no evidence regarding whether the conference was publicized or promoted to POSITAs, who attended the conference and whether they were POSITAs, or the conditions under which the papers were distributed. IPR2017-01904, Paper 9 at 13-18 (PTAB Mar. 12, 2018). Petitioner likewise presents no evidence on these issues.

The MacPherson Declaration, which discusses a copy of Goossens2002 obtained from IEEE Xplore in December 2023, fails to establish public accessibility. EX1025, ¶¶8-9, Exhibit A. Mr. MacPherson alleges that metadata associated with Goossens2002 in IEEE Xplore shows that it was published during the DATE Conference. EX1018, ¶¶8-11, Exhibit A; EX2079, 12:23-14:1, 20:7-24. But Mr. MacPherson has no personal knowledge of the DATE Conference or the metadata,

which came from conference organizers and was not verified by IEEE. EX2079, 20:25-22:19, 14:2-16:20. He did not work at IEEE in that timeframe. *Id.*, 9:5-11, 16:6-16. Mr. MacPherson cannot attest to whether the underlying information, such as the publication date purportedly shown by that metadata, is accurate. EX1018, ¶¶5, 9-10; EX2079, 25:15-26:10. Information in IEEE Xplore can be miscatalogued and inaccurate, IEEE's terms of service state that users should not rely on such information being appropriately catalogued for purposes of "invalidity of ... any patent." EX2081, 3; EX2079, 23:16-25:14.

To the extent Petitioner relies on Goossens2002's alleged availability on IEEE Xplore, there is no evidence that Goossens2002 "was sufficiently indexed, catalogued, and shelved" during the relevant timeframe. *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 9 (PTAB Dec. 20, 2019); *see also Acceleration Bay, LLC v. Activision Blizzard Inc.*, 908 F.3d 765, 774 (Fed. Cir. 2018) (holding that "although [the reference] was indexed by author and year, it was not meaningfully indexed such that an interested artisan exercising reasonable diligence would have found it"); *In re Cronyn*, 890 F.2d 1158, 1161 (Fed. Cir. 1989). IEEE's metrics show *zero* full-text views of Goossens2002 prior to 2011. EX2083; EX2079, 16:23-20:6. Moreover, Mr. MacPherson's testimony cannot establish availability via IEEE Xplore because he did not work at IEEE until 2007 and has no personal knowledge of its practices during the relevant timeframe. EX2079, 9:5-11,

16:6-16; *In re Lister*, 583 F.3d 1307, 1317 (Fed. Cir. 2009) (finding no public availability “absent any evidence pertaining to the general practices” of the databases).

B. Petitioner's Evidence is Insufficient for Goossens2003

For Goossens2003, Petitioner cites the O'Bryan Declaration, which discusses a catalog record at the University of Texas (“UT”). *See* EX1027. During his deposition, Mr. O'Bryan admitted that he did not (1) work at UT during the relevant timeframe or (2) know what several of the field codes mean in UT's MARC record. EX2080, 8:22-9:12, 18:24-21:2; *Lister*, 583 F.3d at 1317. Petitioner provides no evidence that Goossens2003 was indexed, e.g., by subject matter, such that a skilled artisan would have been able to locate it in the relevant timeframe. EX2080, 17:6-18:19 (testifying that the book is currently in the Life Sciences Library and there is no record of where the book was housed in 2003), 11:20-12:5, 13:5-16, 16:10-17 (admitting that his declaration includes the catalog record (Exhibit A) from UT's current system, not UT's locally-developed catalog system used in 2003, and identifies no information migrated from that old system other than the catalog date).

Petitioner also cites a November 2023 webpage printout from SpringerLink. Pet., 10 (citing EX1028). The Board has found that similar evidence is insufficient to establish public accessibility. *See, e.g., In-Depth Geophysical, Inc. v. Conocophillips Co.*, IPR2019-00849, Paper 14 at 10-11 (PTAB Sept. 6, 2019)

("vague date listed on a website page" was insufficient); *Adobe Systems Inc. v. Grecia*, IPR2018-00419, Paper 9 at 9-10 (PTAB Sept. 7, 2018) (finding Internet Archive capture insufficient to establish public accessibility).

VIII. QUALCOMM'S PETITION IS TIME BARRED

Qualcomm filed its Petition more than one year after being served with an infringement complaint. 35 U.S.C. § 315(b). Patent Owner maintains that under the proper statutory interpretation (including the phrase "properly file[d]"), Qualcomm's Petition and joinder motion should have been denied. 35 U.S.C. § 315(c); Paper 7, 14-15. Patent Owner reserves the right to move to terminate if, for example, the Federal Circuit endorses Patent Owner's statutory interpretation.

IX. CONCLUSION

For the foregoing reasons, Petitioner failed to establish that any challenged claim of the '449 Patent is unpatentable.

Respectfully submitted,

Dated: November 19, 2024

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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 13,984 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 November 19, 2024.

Dated: November 19, 2024

By: /s/ Angelo Christopher

Counsel for Patent Owner

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing **Patent Owner's Response** was served on November 19, 2024, via email:

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