

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. 7,594,052

Inter Partes Review No. IPR2024-00343

PATENT OWNER'S RESPONSE

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Exhibit No.	Description
2001	WITHDRAWN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)
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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.artemis.com/blog/busses-crossbars-and-nocs-the-3-eras-of-soc-interconnect-history/
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2010	William Stallings, DATA & COMPUTER COMMUNICATIONS (6th ed. 1999)
2011	RESERVED
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2021	Order Resetting Jury Trial, <i>Network System Technologies, LLC v. Texas Instruments Incorporated</i> , Civil Action No. 2:22-cv-00482-RWS (E.D. Tex.), Dkt. 182 (March 18, 2024)
2022	Claim Construction Order, <i>Network System Technologies, LLC v. Texas Instruments Incorporated</i> , Civil Action No. 2:22-cv-00482-RWS (E.D. Tex.), Dkt. 150 (Jan. 3, 2024)
2023-2026	RESERVED
2027	Complaint, <i>Network System Technologies, LLC v. Samsung Electronics Co., Ltd. et al.</i> , Civil Action No. 2:22-cv-00481-JRG (E.D. Tex.), Dkt. 1 (Dec. 19, 2022)
2028	Docket Control Order, <i>Network System Technologies, LLC v. Samsung Electronics Co., Ltd. et al.</i> , Civil Action No. 2:22-cv-00481-JRG (E.D. Tex.), Dkt. 59 (Jun. 16, 2023)
2029-2032	RESERVED
2033	P.R. 4-3 Claim Construction and Prehearing Statement, <i>Network System Technologies, LLC v. Samsung Electronics Co., Ltd.</i> , Civil Action No. 2:22-cv-00482-RWS (E.D. Tex.), Dkt. 91 (Jan. 9, 2024)
2034	Plaintiff Network System Technologies, LLC's Opening Claim Construction Brief, <i>Network System Technologies, LLC v. Samsung Electronics Co., Ltd.</i> , Civil Action No. 2:22-cv-00482-RWS (E.D.

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	Tex.), Dkt. 100 (Feb. 20, 2024)
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)
2037	Complaint, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.) Dkt. 1 (Dec. 19, 2022)
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2039	Second Amended Scheduling Order, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.) Dkt. 80 (Oct. 23, 2023)
2040	Defendants' Joint Opening Claim Construction Brief, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.), Dkt. 77 (Oct. 12, 2023)
2041	Plaintiff Network System Technologies, LLC's Responsive Claim Construction Brief, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.), Dkt. 81 (Nov. 16, 2023)
2042	Defendants' Joint Reply Claim Construction Brief, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.), Dkt. 83 (Nov. 30, 2023)
2043	Plaintiff Network System Technologies, LLC's Sur-Reply Claim Construction Brief, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.),

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

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2058	Declaration of Peter C. Krusiewicz in Support of Motion for <i>Pro Hac Vice</i> Admission
2059	Confidential Settlement Agreement (Board Only)
2060	Confidential Collateral Agreement (Board Only)
2061	<i>Curriculum vitae</i> of Dr. Nikil Dutt
2062	2014 Design, Automation and Test in Europe Conference (“DATE”) Website Main Page
2063	H. Nejatollahi et al., “Software and Hardware Implementation of Lattice-based Cryptography Schemes,” Center for Embedded and Cyber-Physical Systems (2017)
2064	A. Rădulescu et al., “An efficient on-chip network interface offering guaranteed services, shared-memory abstraction, and flexible network configuration,” Metrics (https://ieeexplore.ieee.org/document/1268998/metric#metrics) (last accessed Sept. 20, 2024)
2065	Terms & Disclosures for Use of IEEE Websites (https://www.ieee.org/about/help/site-terms-conditions.html) (last accessed Sept. 20, 2024)
2066	<i>In re Application of Qualcomm, Inc.</i> , Case No. 1:24-mc-00437-UNA (D. Del.), Subpoena to Testify at a Deposition in a Civil Action, Gordon MacPherson
2067	Transcript of Aug. 27, 2024 Deposition of Dr. Nikil Dutt
2068	Transcript of Sept. 11, 2024 Deposition of Dr. Marwan Hassoun
2069	Transcript of Sept. 20, 2024 Deposition of Gordon MacPherson
2070	Declaration of Dr. Nader Bagherzadeh
2071	<i>Curriculum vitae</i> of Dr. Nader Bagherzadeh
2072	K. Charles Janac, “Network-on-Chip (NoC): The Technology that Enabled Multi-processor Systems-on-Chip (MPSoCs),” Multi-Processor System-on-Chip 1, WILEY 2020
2073	Gul N. Khan, “NOC: Networks on Chip SoC Interconnection Structures,” Electrical, Computer & Biomedical Engineering Toronto Metropolitan University

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2076	Rahul Gulati et al. "SoC interconnect architecture considerations," EDN (March. 21, 2014) available at https://www.edn.com/soc-interconnect-architecture-considerations/#:~:text=SoC%20interconnect%20architecture%20considerations%20%20High%20throughput,objectives%20Freal%20time%20objectives%203%20%20Low%20latency%20objectives
2077	Arabinda Das "Intel's Embedded DRAM: New Era of Cache Memory" EE Times (August 7, 2014)
2078	Andrei Rădulescu et al., "An Efficient On-Chip NI Offering Guaranteed Services, Shared-Memory Abstraction, and Flexible Network Configuration," IEEE Transactions On Computer-Aided Design of Integrated Circuits and Systems, Vol. 24, No. 1 (January 2005)
2079	Archived version of A. Rădulescu et al., "An efficient on-chip network interface offering guaranteed services, shared-memory abstraction, and flexible network configuration," in the IEEE Xplore Digital Library (i.e., https://ieeexplore.ieee.org/document/1268998/), captured on June 23, 2018 by the Internet Archive's Wayback Machine, available at http://web.archive.org/web/20180623162310/https://ieeexplore.ieee.org/document/1268998/
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2081	Declaration of Angelo J. Christopher

I. INTRODUCTION

Network System Technologies, LLC (“Patent Owner”) hereby submits its response to the Petition for *Inter Partes* Review (“Petition”) of U.S. Patent No. 7,594,052 (“the ‘052 Patent”), filed by Qualcomm Incorporated (“Petitioner”). Petitioner has not shown any challenged claim is unpatentable.

II. OVERVIEW OF THE ‘052 PATENT

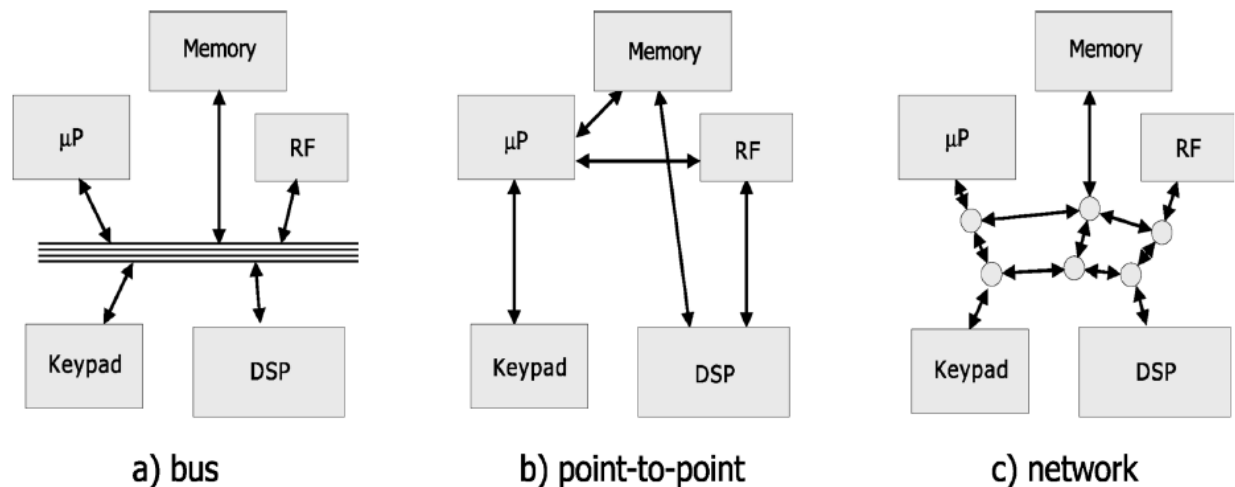
At the time of the invention, systems-on-chip (“SoC”) “show[ed] a continuous increase in complexity due to the ever increasing need for implementing new features and improvements of existing functions.” EX1001, 1:14-16; EX2070, ¶¶64-72.¹ The inventors recognized that conventional SoCs where modules were interconnected via a bus were no longer practical because the large number of modules formed too high a bus load, causing the buses to become a “communication bottleneck.” EX1001, 1:25-32; EX2070, ¶¶64-75, 79.

To solve these and other problems associated with conventional SoCs, the ‘052 Patent discloses a network-on-chip (“NoC”) interconnect. EX1001, 1:33-34; EX2070, ¶79. NoCs are beneficial because: (1) NoCs “share wires, lowering their number and increasing their utilization” and “are scalable compared to buses and (2)

¹ Pursuant to p. 51 of the Trial Practice Guide, Patent Owner withdraws its reliance on the Declaration of Erik Chmelar (EX2001) submitted with the Preliminary Response.

NoCs “decouple computation from communication” by “using protocol stacks, which provide well-defined interfaces separating communication service usage from service implementation.” EX1001, 1:37-47; EX2070, ¶¶72-75, 79-81.

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, 1:50-54, 2:31-42; EX2070, ¶80. By contrast, in traditional SoC interconnects (e.g., buses, switches, or point-to-point wires), all the modules are directly connected. EX1001, 1:50-54, 2:31-42; EX2070, ¶80.

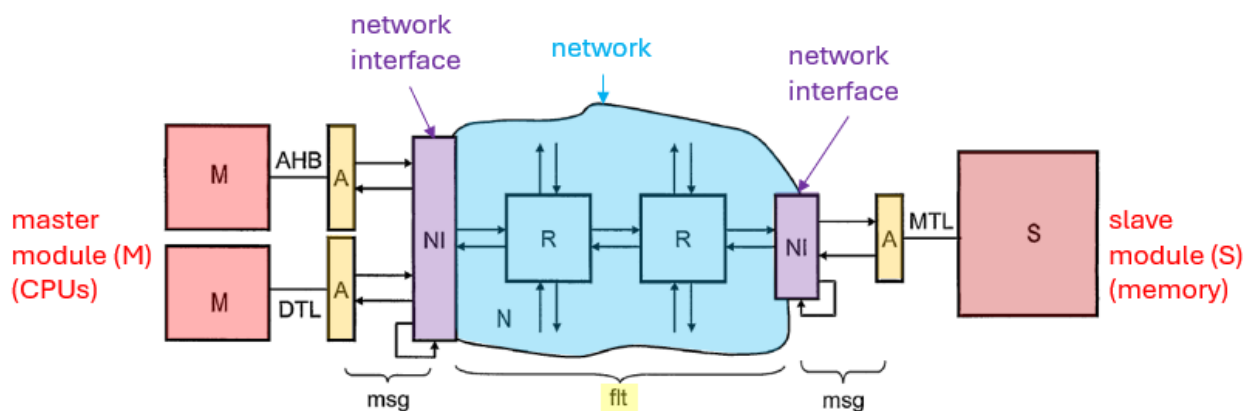


EX2073, 8

NoCs also differ from conventional SoCs because they transmit packets through a network of routers and switches. EX1001, 5:29-31, 6:61-64; EX2070, ¶¶73-75; EX2005, 4; EX2073, 80; EX2075, 2.

The inventors recognized that it would be advantageous to reuse existing IP blocks or modules that use conventional protocols, such as Device Transaction Level (“DTL”), Open Core Protocol (“OCP”), and the AXI Protocol when designing an SoC. EX1001, 2:43-45, 2:65-3:2; EX2070, ¶¶81. However, those existing protocols are incompatible with the packet-based network used in an NoC. EX2070, ¶¶81-83. To solve this problem, the ‘052 Patent discloses differentiated services for bus-based communication protocols (e.g., DTL, MTL, AXI, and OCP) by mapping the identification means of these protocols to connections with the network. EX1001, 4:15-18; EX2070, ¶¶82-83.

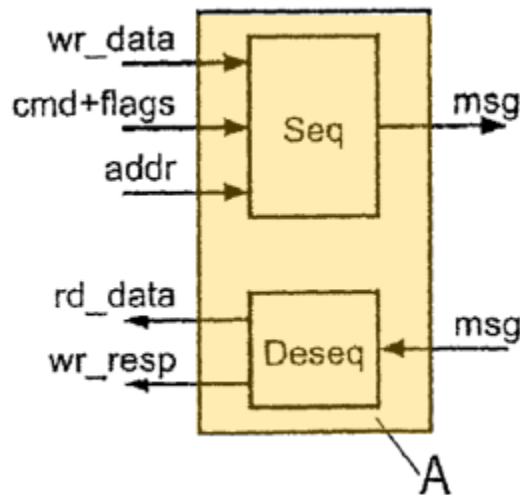
Referring to FIG. 1, the ‘052 Patent discloses an exemplary embodiment including two master modules M (e.g., CPUs), a slave module S (e.g., memory), adapter units A, network interfaces NI, and network N that includes routers R and transmits one or more flits (packets). EX1001, 5:6-31; EX2070, ¶¶83-84.



EX1001, FIG. 1 (annotated)

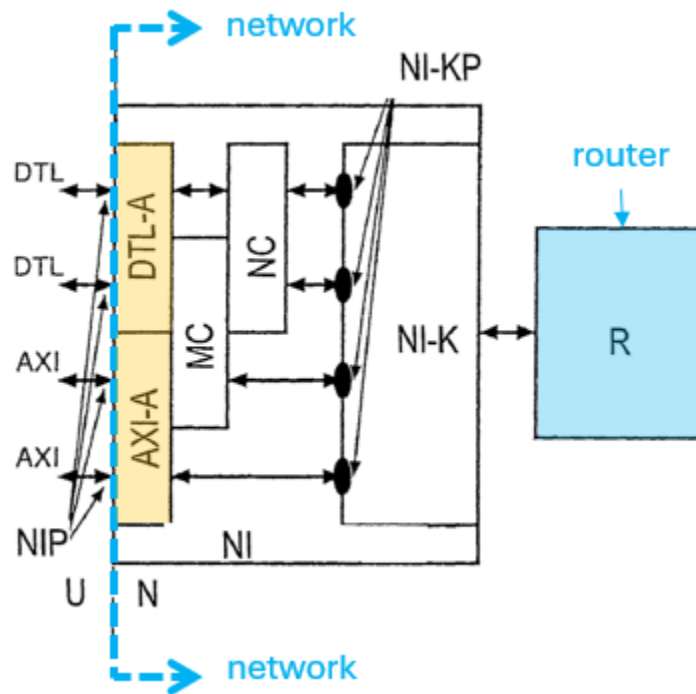
Master module M issues a request (e.g., using DTL or AXI) for a communication service to slave module S. EX1001, 5:53-55; EX2070, ¶83.

This request is received by the adapter unit A, which “translate[s] the requested communication service into messages msg, which are processed by the network interface NI and are translated into flits fit to be transmitted over the network.” EX1001, 5:58-66; EX2070, ¶83. FIGS. 2A and 2B illustrate the adapter unit A according to some embodiments that includes a sequentializing unit and desequentializing unit. EX1001, 6:39-48; EX2070, ¶85.



EX1001, FIG. 2 (annotated)

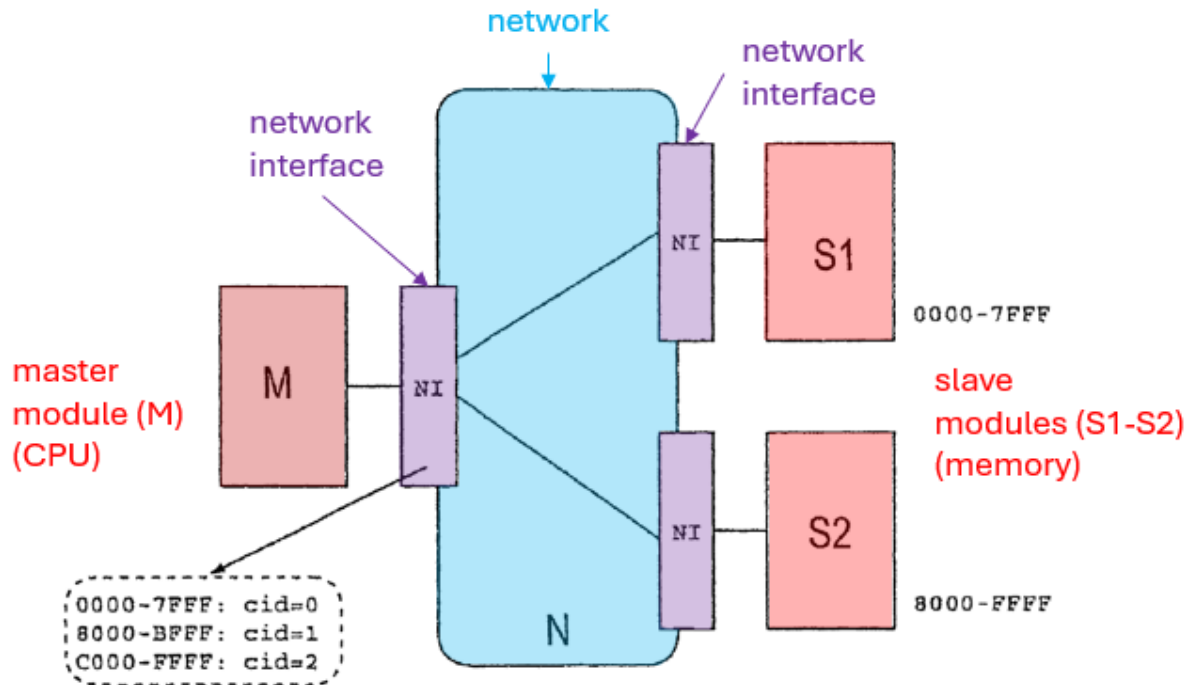
As shown in FIG. 3, the adapter units A can be arranged in the network interface NI, which is responsible for packetization. EX1001, 5:10-13, 6:30-33; EX2070, ¶¶86-87.



EX1001, FIG. 3 (annotated)

The message msg from the adapter unit is sent to the network interface NI, which “provides a conversion of packet-based communication of the network N to the higher-level protocol (AHB, DTL, MTL) that the IP modules of FIG. 1 use.” EX1001, 6:61-64; EX2070, ¶87.

FIG. 4 of the ‘052 Patent illustrates “the operation of the mapping of IP block communication via address ranges to connections.” EX1001, 8:7-9; EX2070, ¶88.



EX1001, FIG. 4 (annotated)

In this example, “the first slave S1 comprises the address range 0000-7FFF and the second slave S2 comprises the address range 8000-FFFF.” EX1001, 8:12-15; EX2070, ¶88. The NI maps a first request to a first connection according to the first address range (0000-7FFF) and a second request to a second connection according to the second address range (8000-FFFF). EX1001, 8:15-25; EX2070, ¶88. Using address ranges for the mapping is advantageous for “protocols where there are no communication threads (e.g., DTL, MTL)” and “can identify one or more slave modules, or a memory region within a slave module, e.g. a buffer used in some particular communication.” EX1001, 8:21-25; EX2070, ¶88.

The '052 Patent teaches the concept of “mapping” requests from the master module to a particular connection according to a communication service identification. In the claims, the communication service identification comprises at least one communication thread or at least one address range. EX1001, 10:6-18; EX2070, ¶89. Because the master module uses an existing protocol without the notion of connection, it cannot know what connections are available or what their properties are. *Id.* To illustrate, when mapping according to a communication thread, the network and network interface know whether the request is intended for a fast memory or a slow memory and, based on this knowledge, maps (1) the request associated with the fast traffic class to a connection configured to guarantee high bandwidth or (2) the request associated with a slow traffic class to a connection with a low guaranteed bandwidth. EX1001, 7:44-55; EX2070, ¶¶89-90.

The concept of “mapping” of requests to connection involves selecting the *right* connection as opposed any connection. EX2070, ¶90. Whether the mapping is according to a communication thread or an address range, “a connection is assigned to assure that that the message is transmitted *via a particular set of transmission requirements.*” EX1001, 8:63-9:5; EX2070, ¶90. The requests are not mapped to merely any available connection; they are mapped to particular connections with particular connection properties. *Id.*

The “mapping” in the ‘052 Patent is crucial “for communication protocols which do not include the notion of connection but are implemented with an interconnect supporting connects (e.g., AEthereal network on chip).” EX1001, 8:47-51; EX2070, ¶91. In other words, the “[b]ackward compatibility” offered via the adapter unit for “exi[s]ting protocols, such as DTL, AXI and OCP” is advantageous because “it enables the use of connections for protocols without the notion of connection, allowing the configuration of differential services for different traffic classes.” EX1001, 8:51-58; EX2070, ¶91.

III. SUMMARY OF PETITIONER’S REFERENCES

Petitioner relies on three references: Rădulescu2004 (EX1005), OCP (EX1006) and Weber (EX1007).

A. Rădulescu2004 (EX1005)

Rădulescu2004 relates to the AEthereal NoC developed by Philips in the early 2000s and prior work by the named inventors of the ‘052 Patent—Andrei Rădulescu and Kees Goossens—who are co-authors of Rădulescu2004. A later version of Rădulescu2004 with the same title and substantially identical content was considered during prosecution. EX1001, 2; EX2078.

Rădulescu2004 describes a “network interface” that “offer[s] shared-memory abstraction, which is independent of the network implementation.” EX1005, Abstract; EX2070, ¶92. This network interface, which is shown in FIG. 1

(reproduced below) includes one or more shells “which implement the connection (e.g., narrowcast, multicast), transaction ordering for connections, and other higher-level issues specific to the protocol offered to the IP.” EX1005, 3 §4; EX2070, ¶92.

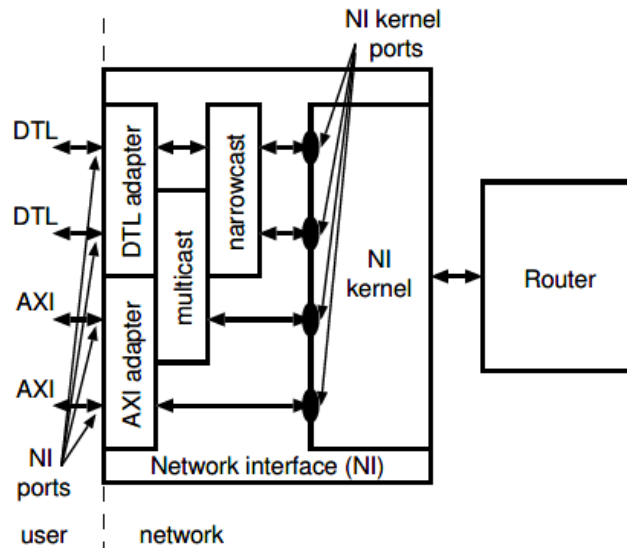


Figure 1. NI kernel and shells

EX1005, FIG. 1

Rădulescu2004's shells implement narrowcast or multicast connections, and “provide conversions to other protocols.” EX1005, 4 §4.2; EX2070, ¶93. In Rădulescu2004, “[n]arrowcast connections are connections between one master and several slaves, where each transaction is executed by a single slave selected based on the address provided in the transaction.” EX1005, 4 §4.2; EX2070, ¶93.

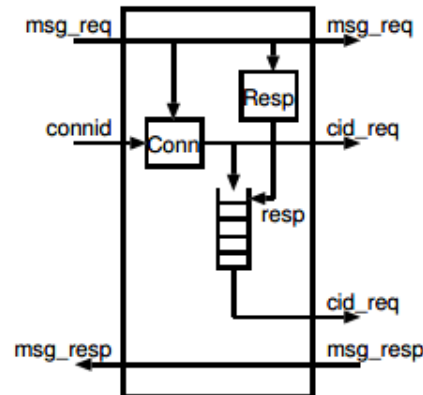


Figure 3. Narrowcast shell

EX1005, FIG. 3

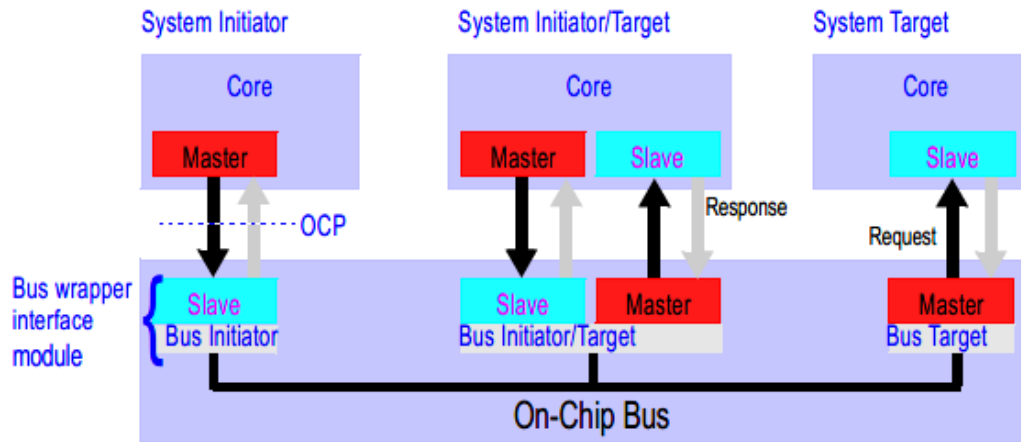
The target of a narrowcast connection is identified according to the address in the request. EX1005, 4 §4.2; EX2070, ¶93. This is performed in the CONN block of the narrowcast shell. *Id.*

The narrowcast module (i.e., the narrowcast shell) is also responsible for implementing ordering of both requests and responses. EX1005, 4 §4.2; EX2070, ¶93. For example, “[t]o provide in-order response delivery, the narrowcast must also keep a history of connection identifiers of the transactions including responses (e.g., reads, and acknowledged writes), and the length of these responses” and “[i]n-order delivery per slave of request messages is already provided by the point-to-point connections.” EX1005, 4 §4.2.

B. OCP (EX1006)

OCP (Open Core Protocol Specification) describes a bus-based protocol. EX1006, 13 (OCP “defines a high-performance, bus-independent interface between

IP cores”); EX2070, ¶94. Figure 1 of OCP illustrates a simple wrapped bus and three IP cores. EX1006, 14; EX2070, ¶94.



EX1006 (FIG. 1)

OCP describes that “[a] system initiator (as the OCP master) presents command, control, and possibly data to its connected slave.” EX1006, 13; EX2070, ¶94.

OCP states that “[e]ach OCP interface on the core must ... [c]ontain at least the basic OCP signals.” EX1006, 15. These basic signals include Clk, MAddr, MCmd, MData, SCmdAccept, SData, and SResp. EX1006, 24; EX2070, ¶94. OCP explains that the MAddr signal “specifies the slave-dependent address of the resource targeted by the current transfer.” EX1006, 24; EX2070, ¶94.

OCP also describes a series of “*optional*” dataflow signals [that] are grouped into simple and complex extensions.” EX1006, 24; EX2070, ¶95. Optional simple signals include MAddrSpace, MBurst, MByteEn, MDataValid, MRespAccept, and SDataAccept. EX1006, 26; EX2070, ¶95. The optional MAddrSpace signal “is an

extension of the MAddr field and is used to indicate the address region of a transfer.”

EX1006, 26; *see also id.*, 43, 84; EX2070, ¶95.

Examples of optional complex extensions include MConnID, MDataThreadID, MThreadBusy, MThreadID, SThreadBusy, and SThreadID. EX1006, 27; EX2070, ¶95. The MThreadID signal is the “[r]equest thread identifier” which “provides the thread identifier associated with the current transfer request.” EX1006, 28; EX2070, ¶95. OCP explains that a simple communication need only use required signals, while the “[o]ptional signals can be configured to support additional core communication requirements.” EX1006, 23; EX2070, ¶95.

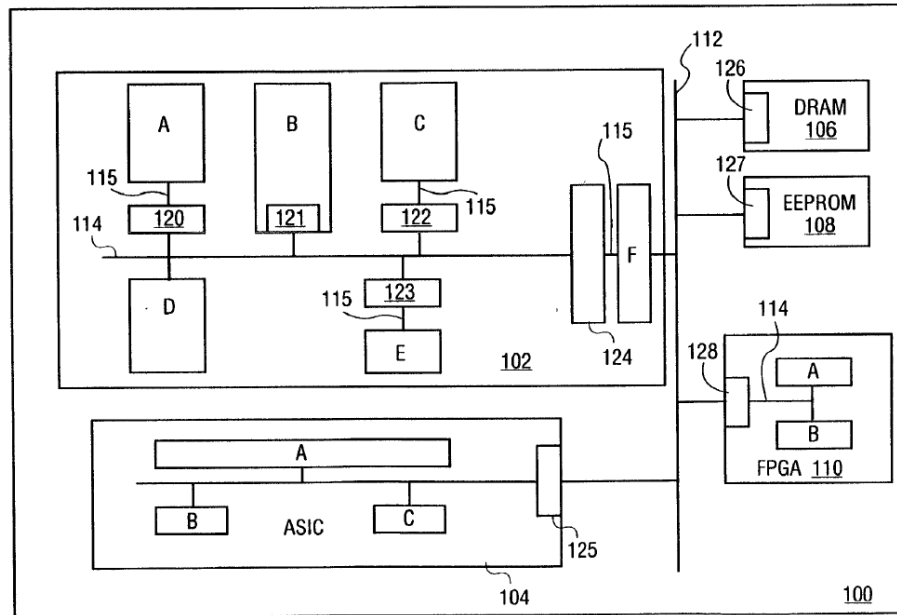
C. Weber (EX1007)

Weber describes disadvantages associated with traditional SoC bus interconnects. For example, Weber recognized that traditional bus interconnects were insufficient to meet the requirements of then-existing systems because they did not support ordering of transactions nor concurrency of operations. EX1007, ¶¶[0007]-[0008]; EX2070, ¶96. Weber also recognized the need to have a low form-factor, i.e., smaller chip size. EX1007, ¶[0003]; EX2070, ¶96.

To address these problems, Weber describes a shared-bus solution that allows subsystems in “large, complex electronics systems to interoperate efficiently regardless of their varying performance characteristics and requirements.” EX1007, ¶[0009]; EX2070, ¶97. For example, in FIG. 1, Weber illustrates functional blocks

on separate integrated circuits that are interconnected via shared buses 112 and 114.

EX1007, ¶[0037]; EX2070, ¶97.



EX1007, FIG. 1

Communication is implemented by interfaces that are directly connected to each functional block that “decode[] an address on shared communication bus 814 to determine if a write is to be performed.” EX1007, ¶[0045]; EX2070, ¶97.

Weber also describes a different embodiment of the shared bus solution in FIG. 14. EX1007, ¶ [0095]; EX2070, ¶98.

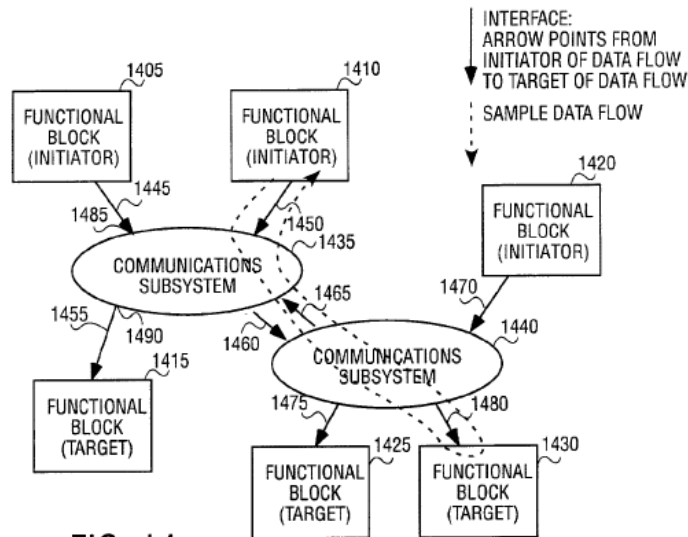


FIG. 14

EX1007, FIG. 14

In this embodiment, functional blocks are connected by communication subsystems.

EX1007, ¶[0095]; EX2070, ¶98.

IV. LEVEL OF SKILL IN THE ART

Petitioner contends that a person of ordinary skill in the art (“POSITA”) “would typically have had at least either a Master’s degree in Electrical Engineering or a related field (such as computer science or computer engineering), as well as at least three years of work experience in the field of SoC design, or a Bachelor’s degree in Electrical Engineering or a related field, as well as at least five years of work experience in the field of SoC design” and a POSITA “would have had an understanding of SoC interconnects, as well as the concepts of large-scale networks.” Petition, 13-14. For purposes of this proceeding only, Patent Owner applies Petitioner’s proposed level of skill. EX2070, ¶¶59-63.

V. CLAIM CONSTRUCTION

The Petition proposes constructions for “interconnect means” and “mapping means” but contends that the remaining terms do not require construction. Pet., 9-10. In the Institution Decision, the Board construed “interconnect means” as a means-plus-function term and found that the preamble of claim 6 is limiting but otherwise did not construe any other claim terms. Paper, 11-18, 25-26.

A. “Interconnect Means (N)” (Claims 1-7)

There are two disputes for “interconnect means.” The first is whether this term is subject to means-plus-function treatment, as Petitioner contends, or whether it should be construed as “multi-hop interconnection between modules separated by one or more network nodes,” as per the prior construction in the Eastern District of Texas. EX2022, 58. The second relates to the corresponding structure if “interconnect means” is a means-plus-function term. The parties’ proposals are summarized below:

Term	Petitioners’ Proposed Construction	Patent Owner’s Proposed Construction
“interconnect means”	Subject to § 112, ¶ 6 Function (claim 6): coupling said plurality of processing modules (M, S). Function (claims 1 and 7): the function of claim 6 plus enabling a connection based	“multi-hop interconnection between modules separated by one or more network nodes” If subject to § 112, ¶ 6 Function (claims 1, 6, and 7): coupling said plurality of processing modules (M, S).

	communication having a set of connection properties Structure: any of a bus, switch, point-to-point wire, or network. Petition at 10.	Function (claims 1 and 7): enabling a connection based communication having a set of connection properties Structure: multi-hop interconnection between modules separated by one or more network nodes
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The '052 Patent teaches that the corresponding structure for the “interconnect means” is a network, which is a “multi-hop interconnection between modules separated by one or more network nodes.” *Infra* §§V.A.1-2. Because the outcome would be same if the Board adopts either Patent Owner's construction or the corresponding structure under Patent Owner's proposal, the Board need not decide whether “interconnect means” is subject to § 112, ¶ 6. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). Instead, the Board need only decide, as it did in the Institution Decision, that the corresponding structure identified by Petitioner is incorrect. Paper 11, 18.

1. “Interconnect Means (N)” is a Name for Structure

“In determining whether a claim term invokes § 112, ¶ 6, the essential inquiry is not merely the presence or absence of the word ‘means’ but whether the words of the claim are understood by persons of ordinary skill in the art to have a sufficiently definite meaning as the name for structure.” *Skky, Inc v. MindGeek s.a.r.l.*, 859 F.3d 1014, 1019 (Fed. Cir. 2017) (internal citations omitted); *see also Apex Inc. v. Raritan*

Computer, Inc., 325 F.3d 1364, 1372 (Fed. Cir. 2003). In this case, a POSITA would have understood that “interconnect means” has a sufficiently definite meaning as the name for structure. EX2070, ¶¶103-110. Specifically, a POSITA would have understood that “interconnect means (N)” refers to a network that can include routers and/or switches, which is structure. EX2070, ¶¶104-108. Indeed, Dr. Hassoun admitted that “[a] router network is a physical structure.” EX2068, 50:20-51:7.

The intrinsic record demonstrates that the ‘052 Patent equates the claimed “interconnect means” with a network. *Edwards Lifesciences LLC v. Cook Inc.*, 582 F.3d 1322, 1329 (Fed. Cir. 2009) (the “interchangeable use of the two terms is akin to a definition equating the two”). The claims include an “(N)” reference sign following “interconnection means,” which clearly refers to the network N described throughout the specification. EX2070, ¶104; EX2068, 49:17-50:5. The specification repeatedly uses the terms “interconnect” or “interconnect means” interchangeably with the term “network” and states that “[t]he interconnect is embodied as a network on chip NOC.” EX1001, 4:46-50, 5:12-31, 10:19-20; EX2070, ¶¶108-109; EX2068, 50:6-19. Indeed, the Board agreed that the specification “describe[s] networks as the interconnect means.” Paper 11, 17 (citing EX1001, 5:7-31, 6:56-64, 7:25-28, 8:9-12, 8:54-58).

In the Institution Decision, the Board stated that there was no “district court ruling regarding whether ‘interconnect means’ is a means-plus-function limitation.”

Paper 11, 17. However, the fact that the *Texas Instruments* court construed interconnect means is at least an implicit finding that it is not a means-plus-function term. EX2022, 20-24, 51; *Facebook, Inc. v. Sound View Innovations, LLC*, IPR2017-00998, Paper 13 at 16 (PTAB Sept. 5, 2017) (recognizing that a claim “either contains means-plus function terms or it doesn’t”). What is more, Dr. Bagherzadeh’s testimony on this point is unrebutted because Petitioner’s expert did not opine on whether “interconnects means” conveys sufficiently definite structure; he merely assumed that § 112, ¶ 6 applies and was not aware that the presumption is rebuttable. EX2068, 47:17-48:11, 49:10-16.

2. “Interconnect Means” or “Network” Refer to a Multi-hop Interconnection Between Modules Separated by One or More Network Nodes

Generally speaking, there are many different “networks.” But in the context of the ‘052 Patent, a “network” is a “multi-hop interconnection between modules separated by one or more network nodes.” EX2070, ¶¶111-112. The meaning of “network” in this context has been litigated in related district court proceedings. For example, in now-settled litigation in the Eastern District of Texas, the court construed “network” as “multi-hop interconnection between modules separated by one or more network nodes.” EX2022, 20-24, 51. Likewise, Petitioner stipulated in

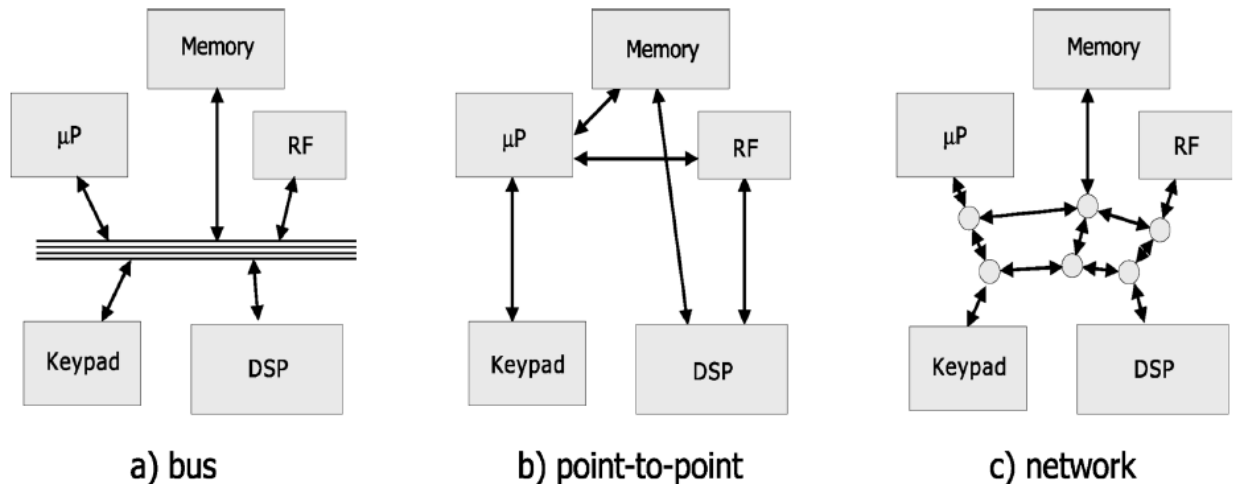
related district court litigation that “network” in closely related patents² means “multi-hop interconnect between modules separated by one or more network nodes.” EX1016, 13.

The district court findings are consistent with the teachings of the ‘052 Patent. The specification teaches that “[i]ntroducing networks as on-chip interconnect radically changes the communication when compared to direct interconnects . . . because of the *multi-hop nature of the network*, where communication modules are not directly connected, but *separated by one or more network nodes*.” EX1001, 2:33-37; EX2070, ¶112. The fact that the ‘052 Patent “distinguish[es] the prior art on the basis of the use of” a multi-hop network separated by one or more network nodes and also “point[s] out the advantages” of such a multi-hop network supports this construction. *SciMed Life Sys. v. Advanced Cardiovascular Sys.*, 242 F.3d 1337, 1343 (Fed. Cir. 2001); *see also Openwave Sys. v. Apple Inc.*, 808 F.3d 509, 517 (Fed. Cir. 2015).

In the Institution Decision, the Board requested “further discussion and evidence of what a ‘hop’ entails.” Paper 11, 43. In a multi-hop interconnect, packets are transmitted from an initiator to a target through one or more intermediate routers

² The parties have agreed that terms should have a common meaning across these patents. *See* EX1016, 13.

or switches or “hops.” EX2070, ¶¶114-115. A “hop” is a router or switch that a packet originating from an arbitrary protocol may traverse. *Id.*; EX2005, 4 (“At each hop, the packet moves from one link to another”); EX2073, 80 (“packet ... keeps hopping from router to router.”); EX2075, 2 (“a hop refers to the number of different networks a data packet must ‘hop’ through to reach a final destination address.”). The graphic below illustrates the difference between a multi-hop interconnect and traditional buses and point-to-point connections:



EX2073, 8

As shown above, each router or switch is indirectly connected to the remaining routers or switches through the “network.” EX2070, ¶¶116-117, 122. The data that “hops” from the indirectly connected “network” of routers or switches is a packet, which is a bundle of data transmitted over a networking communication protocol. EX2070, ¶¶118-119; EX2073, 13 (“NoCs use packets to route data from

the source to the destination [] via a network fabric that consists of switches (routers) [and] interconnection links (wires)").

As taught in the '052 Patent, the multi-hop nature of the claimed interconnect means is very different from a bus-based interconnect where initiators and targets are directly connected to the same bus structure (which does not include routers or switches). EX2070, ¶120. Traditional buses did not send packets. EX2070, ¶¶120-122; EX2073, 15 (the "paradigm shift" from using NoCs instead of buses is that NoCs "[p]ack everything in packets"); EX2076, 2 (explaining that in contrast to traditional bus-based architectures with protocol specific communication, "NoC architectures use the packet-switched network concepts for interaction among the various initiators and targets"). The '052 Patent describes this "packetization" as the key to effectuating NoC communication. EX1001, 6:30-38; EX2070, ¶120.

3. In a Means-Plus-Function Construction, the Corresponding Structure is a Multi-Hop Interconnect

If the Board determines that § 112, ¶ 6 applies, the corresponding structure for the claimed "interconnect means" in the specification is a network, which is a multi-hop interconnection between modules separated by one or more network nodes. *Supra* §V.A.2. As discussed above, the specification clearly links the "interconnect means" and its associated functions to the network described in the specification. *Supra* §V.A.1. There is no dispute that a "network" is a structure.

In the Institution Decision, the Board correctly rejected Petitioner's proposed structure of "any of a bus, switch, point-to-point wire, or network" as being directly contrary to the '052 Patent's teachings. Paper 11, 15-18; EX2070, ¶¶125-126. The background of the '052 Patent contrasts "[u]sing networks for on-chip communication" where "modules communicate remotely via network nodes" from "existing on-chip interconnects (e.g., buses, switches, or point-to-point wires), where the communicating modules are directly connected." EX1001, 1:1:48-54; EX2070, ¶127; Paper 11, 15-16. The specification teaches that "[i]ntroducing networks on on-chip interconnects radically changes the communication when compared to direct interconnects, such as buses or switches." EX1001, 2:31-34; EX2070, ¶127; Paper 11, 16. The specification explains in that a "multi-hop" network "where communication modules are not directly connected" is different from "existing interconnects (i.e., buses) where modules are directly connected." EX1001, 2:34-40; EX2070, ¶127; Paper 11, 16-17.

The problem with the corresponding structure identified by Petitioner is that it would lead to the claims reading on the very prior art that is disparaged and distinguished in the specification. EX1001, 2:31-34; EX2068, 53:22-54:11 (admitting that Petitioner's construction would read on prior art buses). Such a construction cannot be correct. *Openwave Sys.*, 808 F.3d at 517 (rejecting construction that read on prior art disparaged in the specification).

Petitioner's reliance on a single sentence in the specification describing the NoC as including "wires, bus, time-division multiplexing, switches, and/or routers within a network" is misplaced. Petition, 56; EX1001, 4:46-50. As the Board correctly recognized in the Institution Decision, this merely means that the network "could include ... wires and buses" but it does not "mean that the interconnect can be just wires or buses." Paper 11, 17; EX2070, ¶127. A POSITA would understand that the interconnect means "may include wires, bus, time-division multiplexing, switches, and/or routers" that are arranged "within a network." EX1001, 4:46-52; EX2070, ¶127. In other words, the components (e.g., buses, switches, and point-to-point wires) must be arranged such that they implement the packetized, multi-hop scheme separated by one or more network nodes. EX2070, ¶127; *supra*, §V.A.2.

B. "Mapping Means (A)" (Claims 1-5 and 7)

Petitioner argues that "mapping means (A)" is a means-plus-function term and that the corresponding function is "mapping the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties according to said at least one communication service identification." Petition, 11-13. Petitioner also argues that the corresponding function is "adapter unit/shell comprising a sequentializing unit and a desequentializing unit as disclosed in the '052 Patent at 5:58-6:3, 6:30-7:14, FIGs. 1, 2A, and 2B." *Id.* Patent Owner applies Petitioner's construction for

purposes of this proceeding because Petitioner failed to meet its burden under this construction. *Infra*, §VI.E.2; EX2070, ¶¶130-131.

C. The Preamble of Claim 6 is Limiting

The Board correctly found in the Institution Decision that the preamble of claim 6 is limiting. Paper 11, 25-26. Indeed, the parties agree in this proceeding and related litigation that the preamble is limiting. EX2040, 5-6; EX2070, ¶¶132-135; EX2068, 67:16-68:11. “A preamble limits the claimed invention if it recites essential structure or steps, or if it is necessary to give life, meaning, and vitality to the claim.” *Bio-Rad Lab'ys, Inc. v. 10X Genomics Inc.*, 967 F.3d 1353, 1369 (Fed. Cir. 2020). The preamble of claim 6 does just that because it recites structure, function, and provides antecedent basis for several terms in the body of the claim, including: (1) “plurality of processing modules (M, S)”; (2) “at least one communication service”; (3) “specific communication properties”; and (4) “at least one communication service identification.” EX1001, 10:7-32; EX2070, ¶133-134.

D. “Integrated Circuit” (Claims 1-6)

The term “integrated circuit” appears in claims 1 and 6. To the extent the Board determines that claim construction is necessary, the parties agreed in related district court litigation that the term “integrated circuit” should be construed as “interconnected circuitry on a chip.” EX1016, 13; *see also* EX2022, 59 (construing

integrated circuit as “a combination of interconnected circuit elements inseparably associated on or within a continuous substrate”); EX2070, ¶138.

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

Petitioner raises four challenges: (1) anticipation by Rădulescu2004 (claims 1-2, 5-7); (2) obviousness over Rădulescu2004 in view of OCP (claims 1-7); (3) anticipation by Weber (claims 1-7); and (4) obviousness over Weber in view of Rădulescu2004 (claims 1-7). For the reasons discussed below, Petitioner failed to carry its burden for any of these grounds.

A. Petitioner Failed to Establish that Rădulescu2004 Qualifies as Printed Publication Prior Art

Petitioner argues that Rădulescu2004 was “available to the public” more than one year prior to the ‘052 Patent’s effective filing date (i.e., by March 7, 2004), but failed to meet its burden to establish that Rădulescu2004 qualifies as prior art. *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 8-11 (PTAB Dec. 20, 2019) (precedential); *Acceleration Bay, LLC v. Activision Blizzard Inc.*, 908 F.3d 765, 772 (Fed. Cir. 2018).³ The Petition violates the Board’s rules by incorporating arguments by reference. Pet., 2-3. But even if considered, Petitioner’s evidence does not establish that Rădulescu2004 qualifies as prior art.

³ The Institution Decision made no findings regarding Rădulescu2004’s alleged public accessibility. *See* Paper 11.

At the outset, the authors were working on multiple versions of papers with the same title as Rădulescu2004. Another paper with the same title and nearly identical content as Rădulescu2004 bearing a “January 2005” date was considered during prosecution of the ‘052 Patent. EX2078; EX1001, cover. This later version was “revised June 9, 2004,” which was *after* the ‘052 Patent’s earliest priority date. EX2078, 1; EX1001, cover. As set forth below, Petitioner has not established that the version in Ex. 1005 was available as of the critical date.

1. Petitioner Did Not Comply with the Board’s Rules

Petitioner baldly asserts that Rădulescu2004 “was available to the public” but is silent as to when or how Rădulescu2004 “was disseminated or otherwise made available to the extent” POSITAs, “exercising reasonable diligence, [could have] located it.” Petition, 2-3; *Acceleration Bay*, 908 F.3d at 772.

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. § 42.204(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); *see also Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016). Further, “arguments must not be incorporated by reference from one document into another document.” 37 C.F.R. § 42.6(3).

Petitioner's blanket citations to Exhibits 1018 ("MacPherson Declaration"), 1012 ("Dutt Declaration"), and 1013 ("RFA Responses") "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 declarations regarding publication whose content was incorporated by reference); *see also Red Diamond, Inc. v. S. Visions, LLP*, IPR2019-01671, Paper 35 at 41 (PTAB Mar. 31, 2021); *Kaz Usa, Inc. v. Exergen Corp.*, IPR2016-01437, Paper 43 at 36 (PTAB Dec. 22, 2017).

2. Petitioner Failed to Establish Public Accessibility at the Date Conference for pre-AIA § 102(b)

While Rădulescu2004 bears a copyright date of "2004," that fails to prove that it was available prior to March 7, 2004. EX1005; *Victoria's Secret Stores LLC v. Andra Grp.*, IPR2020-00853, Paper 12 at 24-25 (PTAB Oct. 22, 2020) (finding copyright date alone was insufficient at institution stage); *Medivis*, IPR2023-00042, Paper 35 at 27 (finding copyright date alone "inadequate" in final written decision). Petitioner's incorporated-by-reference evidence primarily relates to the 2004 Design, Automation and Test in Europe Conference and Exhibition ("DATE Conference"), but Petitioner failed to show that Rădulescu2004 was publicly accessible at the DATE Conference.

a. The Dutt Declaration is Insufficient

While Dr. Dutt purports to be a neutral and independent witness, cross-examination revealed that Dr. Dutt has extensive ties to Petitioner: he has received hundreds of thousands of dollars in unrestricted research gifts from Petitioner and co-authored publications with Petitioner's employees. EX2067, 86:8-88:23, 95:20-97:9, 98:17-99:9; EX2061 at 32; EX2063 at 1-2.⁴ Accordingly, the Board should give Dr. Dutt's testimony less weight than that of a disinterested witness. *American Simmental Ass'n v. Leachman Cattle of Colorado, LLC*, PGR2015-00005, Paper 52 at 23 (PTAB June 13, 2016).

Critically, Dr. Dutt has **zero** personal knowledge as to whether Rădulescu2004 was accessible at the DATE Conference 20+ years ago. Dr. Dutt does not attest to personally receiving, seeing, or retaining Rădulescu2004 or attending its presentation. See EX1012, ¶¶11-23. Instead, Dr. Dutt saw Rădulescu2004 for the first time when preparing his declaration. EX2067, 47:3-13, 68:7-69:9; see also *id.* at 51:25-54:2 (admitting he only checked his copy of the conference materials for his own papers), 47:14-50:6 (admitting he does not remember attending a presentation of Rădulescu2004 or meeting the authors), 63:7-64:11. Instead, Dr.

⁴ Dr. Dutt initially refused to answer questions regarding his work with Petitioner's employees. EX2067, 76:11-80:8.

Dutt's personal knowledge is limited to his own papers. EX1012, ¶¶12, 19, 22; EX2067, 51:16-21, 52:15-53:1, 68:7-15.

Dr. Dutt states that “[a] copy of all the papers accepted for the [DATE Conference] (either in paper or CD form) was given to the conference participants upon registration at the start of the conference.” EX1012, ¶13. However, Dr. Dutt does not know what form the materials were provided in. EX2067, 37:5-39:7. He also does not know what he did with his copy of the materials and likely discarded it. EX2067, 38:4-39:7, 41:10-23. Dr. Dutt did not even attempt to locate a copy of the DATE Conference materials. EX2067, 41:10-23, 12:23-14:14. Furthermore, Dr. Dutt admits that he was not an organizer of the Date Conference and does not know how Rădulescu2004 was handled by the organizers. EX2067, 29:14-21, 30:12-31:6, 44:14-45:5, 53:6-14, 57:24-59:2.

Consistent with prior Board decisions, Dr. Dutt's testimony should be afforded minimal weight because he has no relevant personal knowledge. *C&D Zodiac, Inc. v. B/E Aerospace, Inc.*, IPR2014-00727, Paper 65 at 28-30 (PTAB Oct. 26, 2015) (finding no public accessibility where one declarant “lacked personal knowledge of whether the [relied-upon] version of the Orange Book ... was actually published” and another declarant “[did] not establish that any Orange Book ever came into [his] possession prior to the critical date”); *Toyota Motor Corp. v. American Vehicular Sciences LLC*, IPR2013-00417, Paper 78 at 15 (PTAB Jan. 7,

2015) (giving “minimal weight” to testimony that provided no explanation of “personal knowledge of the publication date” or “any involvement with publication of the article”); *see also Ingenico Inc. et al. v. IOENGINE, LLC*, IPR2019-00879, Paper 69 at 75-76 (PTAB Sept. 21, 2020) (giving “little weight” to testimony about whether a document was included with a product purchased twenty years ago due to lack of personal knowledge).

In *Power Integrations, Inc. v. Semiconductor Components Industries, LLC*, the petitioner failed to show that a paper was accessible at a conference because there was no evidence regarding the conditions under which the conference papers were distributed. IPR2017-01904, Paper 9 at 13, 17-18 (PTAB Mar. 12, 2018). Here, Dr. Dutt admitted that “[attendees] were not allowed to distribute the papers ... without permission.” EX2067, 39:25-40:7. This contradicts his claim that “[t]here were no confidentiality restrictions at this conference.” EX1012, ¶17. Further, there is no way to corroborate Dr. Dutt’s declaration because he did not retain his copy of the DATE Conference materials. EX2067, 38:4-39:7, 41:10-23.

Because Dr. Dutt has no relevant personal knowledge, his declaration is based entirely on an “archive” website that purportedly associates Rădulescu2004 with the DATE Conference. EX1012, ¶¶20-22, Exhibit 1 (“‘archive’ website”); EX2067, 12:23-14:14 (admitting he had to visit the “archive” website “to factually determine ... which papers were presented and were in the proceedings at that conference”).

However, Dr. Dutt has no personal knowledge regarding the creation of this website. EX2067, 57:24-59:2 (admitting he did not create the “archive,” does not know when the “archive” was created or made available to the public, and is only viewing it “at this ... point in time”). Dr. Dutt’s testimony should be afforded minimal weight because he has no relevant personal knowledge. *Toyota*, IPR2013-00417, Paper 78 at 14-15.

Dr. Dutt’s declaration also cites Mr. Goossens’ website as purported evidence that Rădulescu2004 was presented at the DATE Conference. EX1012, ¶23, Exhibit 2 (“Goossens website”). Remarkably, Dr. Dutt did not even review the Goossens website in preparing his declaration. EX2067, 12:23-14:14. Additionally, similar to the “archive” website, Dr. Dutt has no personal knowledge regarding the Goossens website and admitted that it “doesn’t explicitly state that [Rădulescu2004] was presented.” EX2067, 59:23-60:16, 62:6-10; *Toyota*, IPR2013-00417, Paper 78 at 14-15.

The Dutt Declaration also fails to establish whether the DATE Conference was attended by any POSITAs. *Power Integrations*, IPR2017-01904, Paper 9 at 9-10. In *Power Integrations*, the Board found that public accessibility of a conference paper was not established because there was no evidence (i) that the conference was publicized or promoted to POSITAs and (ii) regarding who attended the conference and whether they were POSITAs. *Id.* at 13-17. The petitioner’s citation to a “table

of contents” showing authors of the papers was insufficient. *Id.* at 13-16. Additionally, there was no evidence that the petitioner's declarant was a POSITA at the time of the conference. *Id.* at 15-17.

Here, Petitioner proffers no evidence that the DATE Conference was publicized or promoted to, or attended by, POSITAs.⁵ Dr. Dutt never mentions the POSITA standard, admitted that he has no familiarity with the '052 Patent, and refused to answer questions about SoC, NoC, large scale networks, and whether he had experience with SoC design before 2004. *See* EX1012; EX2067, 9:25-10:18, 80:16-84:20; Pet., 13-14 (defining a POSITA). Thus, as in *Power Integrations*, Petitioner “does not provide sufficient evidence that any person attending the conference satisfied Petitioner's assessment of a [POSITA].” IPR2017-01904, Paper 9 at 16.

The Dutt Declaration also lacks corroboration. In *American Simmental*, the petitioner offered declarations from disinterested witnesses regarding prior art status, and even though the testimony was “credible,” there was insufficient corroboration because a first exhibit, which post-dated the priority date, was “weak corroborative evidence,” and a second exhibit did “not provide sufficient corroboration.”

⁵ Petitioner's expert offered no opinions on Rădulescu2004's prior art status. EX2068, 89:1-10.

PGR2015-00005, Paper 52 at 22-25. Here, Dr. Dutt is not a disinterested witness, and the “archive” and Goossens websites post-date the priority date. The Board need not find that Dr. Dutt lacks credibility—it need only conclude that the lack of corroborative evidence warrants a finding that Petitioner has not carried its burden.

b. The MacPherson Declaration is Insufficient

The MacPherson Declaration, which discusses a copy of Rădulescu2004 obtained from IEEE Xplore in October 2023, also fails to establish public accessibility. EX1018, ¶¶8-9, Exhibit A (“IEEE-Rădulescu2004”). Mr. MacPherson alleges that metadata associated with IEEE-Rădulescu2004 shows that it was published during the DATE Conference. EX1018, ¶¶10-11, Exhibit A; EX2069, 12:23–14:1, 20:7-24.

Petitioner's reliance on this testimony is misplaced because Mr. MacPherson has no personal knowledge of the DATE Conference or the metadata, which came from conference organizers and was not verified by IEEE. EX2069, 20:25–22:19, 14:2–16:20. Indeed, he did not work at IEEE in that timeframe. EX1018, 4 (Exhibit A); EX2069, 9:5-11, 16:6-16. Most importantly, 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; EX2069, 25:15–26:10. Information in IEEE Xplore can be miscatalogued and inaccurate—indeed, IEEE's terms of service contain an express disclaimer stating that users should not rely on

such information being appropriately catalogued for purposes of “invalidity of ... any patent.” EX2065, 3; EX2069, 23:16–25:14.

c. District Court RFA Responses Are Insufficient

Petitioner's reliance on Patent Owner's RFA Responses is improper because they do not constitute “an admission for any other purpose and cannot be used against the party in any other proceeding.” FRCP 36(b). The Board has declined to rely on such RFA responses because “[d]uring the district court litigation, Patent Owner may have agreed to stipulate to certain facts to streamline matters at trial there, for example, or had other reasons to stipulate on the issue ..., regardless of whether the [reference] was, in fact, publicly accessible or not.” *Argentum Pharms. LLC v. Research Corp. Techs., Inc.*, IPR2016-00204, Paper 19 at 10-11 (PTAB May 23, 2016) (informative).

3. Petitioner Failed to Establish Public Accessibility Following the Date Conference for pre-AIA § 102(a)

The Petition does not allege that Rădulescu2004 qualifies as prior art under pre-AIA §102(a). Petition, 2-3. To the extent Petitioner attempts to rely on a later publication date in its reply, the critical date is March 17, 2004. EX1001, cover. For the DATE Conference, any contention under §102(a) would fail for the same reasons discussed above. *Supra*, §VI.A.2. Further, the DATE conference's proceedings are not “publically [sic] available” until “two years after” the conference, i.e., after the

critical date. EX2062. Dr. Dutt did not know how or when non-attendees would receive papers from the DATE Conference. EX2067, 43:19-45:5.

To the extent that Petitioner relies on the “archive” and Goossens websites included with the Dutt Declaration, this fails because there is no evidence that those websites were available before the ‘052 Patent’s §102(a) date. Indeed, Dr. Dutt accessed the “archive” and Goossens websites on “11/3/23” and “10/29/23,” respectively. EX1012, Exhibits 1-2. Dr. Dutt has no personal knowledge regarding those websites. *E.g.*, EX2067, 57:24-59:2, 59:23-60:16. Moreover, Petitioner fails to show that interested POSITAs could have located Rădulescu2004 at those websites. *Blue Calypso, LLC v. Groupon, Inc.*, 815 F.3d 1331, 1348-50 (Fed. Cir. 2016).

To the extent Petitioner relies on Rădulescu2004’s alleged availability on IEEE Xplore, there is zero evidence that Rădulescu2004 “was sufficiently indexed, catalogued, and shelved” during the relevant timeframe. *Hulu*, IPR2018-01039, Paper 29 at 9. Petitioner provides no evidence that Rădulescu2004 was indexed by, for example, subject matter. *Acceleration Bay*, 908 F.3d at 774 (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) (holding that theses “were not accessible to the public because they had not been either cataloged or

indexed in a meaningful way”). In other words, the mere fact that Rădulescu2004 was allegedly “[a]dded to IEEE Xplore,” standing alone, does not mean that a skilled artisan could have located it through reasonable diligence. EX1018, 4 (Exhibit A).

IEEE’s metrics show *zero* full-text views of Rădulescu2004 prior to 2011. EX2064; EX2069, 16:23–20:6. Consistent with the lack of any pre-2011 activity on IEEE Xplore, the Internet Archive has no captures of Rădulescu2004 on IEEE Xplore prior to 2018. EX2079; EX2080. Moreover, Mr. MacPherson’s testimony cannot establish availability via IEEE Xplore because he did not work at IEEE until 2007 and thus has no personal knowledge of its practices during the relevant timeframe. EX2069, 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 Failed to Establish that OCP Qualifies as Printed Publication Prior Art

Petitioner failed to establish that OCP qualifies as prior art.⁶ Similar to Rădulescu2004, the Petition does not identify *any* basis for its assumption that OCP was publicly accessible and fails to explain the relevance of Exhibits 1013 and 1019. Pet., 3; *Acceleration Bay*, 908 F.3d at 772; *supra*, §VI.A.1. In fact, Petitioner’s bald

⁶ The Institution Decision made no findings regarding OCP’s status as prior art. *See* Paper 11.

assertion that “OCP was published in 2001” is inconsistent with its cited evidence. Pet., 3 (citing EX1013 and EX1019 showing archives from 2003). The only possible support for Petitioner's assertion is OCP's copyright date of “2001,” but this alone cannot establish public accessibility. Pet., 3; EX1006, 4; *Victoria's Secret*, IPR2020-00853, Paper 12 at 24-25; *Medivis*, IPR2023-00042, Paper 35 at 27.

The Petition cites an Internet Archive Affidavit (EX1013) and Internet Archive Declaration (EX1019), each consisting of an archived webpage. Pet., 3. But this evidence does not show public accessibility. First, the Affidavit concerns a PDF that was archived in August 2003. EX1013, 1-5. Petitioner presents no evidence that interested POSITAs knew of the URL or would have been able to locate the PDF through reasonable diligence. *Grünenthal GMBH v. Antecip Bioventures II LLC*, PGR2017-00022, Paper 50 at 18-19 (PTAB Nov. 14, 2018) (finding that a Wayback Machine affidavit “is insufficient by itself” and petitioner did not establish that the materials “would have been located online by interested [POSITAs] exercising reasonable diligence”); *Schlumberger Tech. Corp. v. Integrated Drive Systems LLC*, IPR2018-00603, Paper 40 at 16-17, 23-24 (PTAB Sept. 3, 2019) (finding no public accessibility where “Petitioner's evidence ... amounts to little more than the ... testimony of [the Wayback Machine declarant] that Joy was available on the Internet by [a certain date]”); see also *Nautilus, Inc. v. Icon Health & Fitness Inc.*, IPR2017-

01363, Paper 33 at 16-19 (PTAB Nov. 28, 2018); *Blue Calypso*, 815 F.3d at 1349-50.

Second, the Declaration concerns a webpage archived on October 3, 2003. EX1019, 1-5. However, this webpage does **not** contain OCP (EX1006) and only contains hyperlinks, which also do not contain OCP. EX1019, 5. This evidence is insufficient. *Coalition for Affordable Drugs VIII, LLC v. The Trustees of the Univ. of Penn.*, IPR2015-01835, Paper 56 at 20-22 (PTAB Mar. 6, 2017) (finding no public accessibility because Wayback Machine screenshots showed only a hyperlink). Petitioner also presents no evidence that interested POSITAs could have located this webpage.

Additionally, OCP contains a statement of confidentiality and restricted use, including that OCP contains “confidential” material, users should assume OCP’s contents are “confidential and proprietary,” and “disclosure or use” of OCP is “prohibited.” EX1006, 4. This shows that OCP was **not** publicly available.

Finally, the fact that the ‘052 Patent references OCP does not support an inference that EX1006, which is a specific document for a specific version of OCP, was publicly accessible. Petition, 3; EX1006, 1

C. Petitioner Failed to Meet its Burden for Ground 1

Petitioner failed to meet its burden for Ground 1 because Petitioner failed to demonstrate that Rădulescu2004 discloses (1) “said at least one communication

service identification comprises at least one communication thread or at least one address range” or (2) the claimed “mapping.” EX2070, ¶¶141-172.

1. Rădulescu2004 Does Not Disclose the Claimed Communication Service Identification (Claims 1-7)

Each independent claim recites a “communication service identification” that includes “at least one communication thread or at least one address range.” EX1001, 9:45-48, 10:9-18, 10:39-44.⁷ The “address range” is for “identifying one or more second processing modules (S) or a memory region within said one or more second processing modules.” *Id.* Petitioner does not allege that Rădulescu2004 discloses a “communication thread” and only contends that Rădulescu2004 discloses an “address range.” Petition, 22-25; EX2068, 90:3-6; EX2070, ¶146.

Petitioner argues that Rădulescu2004's requests “include an address that identifies a slave and/or a memory within the slave.” Petition, 24 (citing EX1005, 1, 2, 4, FIG. 5). However, as the Board correctly found in the Institution Decision, the cited portions of Rădulescu2004 describe, at best, a request comprising an address, but not an address *range*. Paper 11, 25-26; EX2070, ¶¶146-161. Unlike a single address, an address range has a lower bound and an upper bound that specifies a continuous block or series of addresses. EX2070, ¶148. For example, if the address

⁷ Petitioner repeats its arguments for [6.pre.2] for claims 1 and 7. *See* Petition, 33; EX2070, ¶172.

range is “0000-7FFF,” the first portion (0000) specifies the lower bound while the second portion (7FFF) specifies the upper bound of the range. EX1001, 8:12-15; EX2070, ¶148; EX2068, 37:2-17.

Contrary to Petitioner's suggestion, when Rădulescu2004 states that “master IP modules issue request messages (e.g., read and write commands at an address, possibly carrying data) that are executed by the addressed slave modules,” this merely describes a single address for a slave. Petition, 24 (citing EX1005, 1); EX2070, ¶148. When Rădulescu2004 states that “[m]asters initial transactions by issuing requests ... and write data (corresponding to the address and write signal groups in AXI”), this also refers to a single address, not an address range. Petition, 24 (citing EX1005, 2); EX2070, ¶¶148-150. Similarly, when Rădulescu2004 refers to “the address provided in the transaction,” this is only referring to a single address. Petition, 24 (citing EX1005, 4); EX2070, ¶¶148-150.

Petitioner notes that FIG. 5 of Rădulescu2004 “includes ‘addr’ signals.” Petition, 24 (citing EX1005, FIG. 5). However, a POSITA would immediately recognize that “addr” refers to an address – not an address range. EX2070, ¶¶154, 156. This understanding is consistent with OCP, which Petitioner relies on in Ground 2. EX2070, ¶157; *infra* §VI.D. In OCP, “MAddrSpace” refers to “the address region of a transfer,” while “MAddr specifies the slave-dependent address of the resource targeted by the current transfer.” EX1006, 24-26; EX2070, ¶157. This terminology

is also consistent with references that were considered during prosecution. EX1002, 91 (using “ADDR_SPC” to refer to an address range). Additionally, the later version of Rădulescu2004 expressly states that “ADDR” refers to “the address” rather than an address range. EX2078, 8; EX2070, ¶156.

Petitioner also argues that Rădulescu2004 “discloses that each slave identified by an address has an address range associated therewith.” Petition, 24. In particular, Petitioner relies on Rădulescu2004’s statements that “[w]ithin a narrowcast connection, the slave for which the transaction is destined is selected based on the address (Conn block)” and “[t]he address range assigned to a slave is configurable in the narrowcast module.” *Id.*, 24-25 (citing EX1005, 4). From there, Petitioner argues that Rădulescu2004 discloses that “the requests for communication services (read/write) operations made by the Master IP module include a communication service identification *corresponding* to ‘at least one address range.’” *Id.*, 25. Petitioner is incorrect.

Rădulescu2004 discloses that “[n]arrowcast connections are connections between one master and several slaves, where each transaction is executed by a single slave selected *based on the address provided in the transaction*.” EX1005, 4 §4.2; EX2070, ¶149. Rădulescu2004 also explains that “the slave for which the transaction is destined is selected *based on the address* (CONN block)” and that “[t]he address range assigned to a slave is configurable in the narrowcast module.”

EX1005, 4 §4.2; EX2070, ¶159. Petitioner conflates two disparate concepts in Rădulescu2004: (1) that a request is based on an address and (2) that a slave can be assigned an address range in the narrowcast shell. EX2070, ¶159; EX1005, 4 §4.2. Combining these concepts makes clear that the requested communication service in Rădulescu2004 is not based on an address range. EX2070, ¶159. Instead, the requested communication service is based on an address, while the address range assigned to a slave is configurable in the narrowcast shell. *Id.* The fact that the address range is configurable in the narrowcast shell after the master sends the requested communication service means that the master would not know what address range. *Id.* This confirms that the request does not include an address range.

As the Board correctly found in the Institution Decision, Rădulescu2004, merely indicates that the communication service identification contains an address for the slave and that the slave can have an address range; but that does not mean the communication service identification contains an address range. Paper 11, 25; EX2070, ¶161.

2. Rădulescu2004 Does Not Disclose the Claimed “Mapping” (Claims 1-7)

Claim 6 recites “mapping the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties according to said at least one communication service identification.” EX1001, 10:28-32. Claims 1 and 7 includes substantively identical

limitations. EX1001, 9:41-45, 10:54-58. Rădulescu2004 fails to disclose the claimed “mapping” for several reasons.

As an initial matter, Rădulescu2004 does not disclose the claimed “mapping” that is “according to said at least one communication service identification” because Rădulescu2004 does not disclose the claimed “communication service identification.” *Supra*, §VI.C.1; EX2070, ¶162. But even if it did, Rădulescu2004 fails to disclose “mapping ... to a connection based on a set of connection properties.” EX2070, ¶163. The Petition argues that Rădulescu2004 discloses that a communication service request is mapped to a “point-to-point connection based on the address provided in the request.” Petition, 30-31 (citing EX1005, 4 §4.2, FIGS. 1-3, 4-9). But the Petition omits any analysis as to whether Rădulescu2004 discloses “mapping ... to a connection *based on a set of connection properties*” as required by the ‘052 Patent.

The claimed “mapping” requires: “**mapping the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties according to said at least one communication service identification.**” EX1001, 10:28-32; EX2070, ¶164. As explained in the specification, the objective is to take a request “and map it to the *right connection* having connection properties.” EX1001, 8:36-36; EX2070, ¶¶164, 166, 169. For example, “[w]here communication threads are used to identify traffic

classes of a communication based on specific communication parameters, such a thread and the associated traffic class can be mapped to *a connection based on specific corresponding connection properties.*" EX1001, 7:44-48. As another example, "[i]f a message is sent to a particular address range in the system, or belongs to a particular thread, a connection is assigned to assure that the message is transmitted via a particular set of transmission requirements." EX1001, 8:64-9:5.

In other words, the claim requires mapping to a *specific* connection having *specific* connection properties as opposed to any available connection. EX2070, ¶¶166, 169. The Petition fails to address how Rădulescu2004 purportedly discloses mapping to a particular connection having a particular set of connection properties. Petition, 30-32; EX2070, ¶167. Rădulescu2004 does not disclose the claimed "mapping" because it fails to consider any "connection data" when selecting which connection to use to transmit the requested communication service. EX2070, ¶167. Instead, Rădulescu2004 merely selects the slave "based on the address provided in the transaction" without regarding to the specific "connection properties" of the connection. EX1005, 4 §4.2; EX2070, ¶¶164-166.

3. Dependent Claims 2 and 5

Because claims 2 and 5 depend from claim 1, Rădulescu2004 does not anticipate these claims for the same reasons as claim 1. EX2070, ¶172.

D. Petitioner Failed to Meet its Burden for Ground 2

Petitioner alleges that a POSITA would be motivated to include OCP's threads and OCP's MAddrSpace signals in Rădulescu2004. Petition, 38-39, 42. Specifically, Petitioner alleges that the MThreadID signal in OCP corresponds to the claimed "communication thread" and the MAddrSpace signal corresponds to the claimed "address range." *Id.*, 41-42.

Petitioner failed to meet its burden because Petitioner failed to demonstrate that (1) a POSITA would be motivated to combine OCP's optional MAddr, MAddrSpace, and MThreadID signals into Rădulescu2004's system; and (2) that OCP cures the deficiencies of Rădulescu2004 with respect to the "mapping" requirement. EX2070, ¶¶173-210.

1. Petitioner Failed to Establish Why One Would Use OCP's Optional Signals (Claims 1-7)

Petitioner wrongly assumes that OCP's MThreadID and MAddrSpace signals are always communicated by a master functional block. Petition, 38 (alleging that OCP requests "utilize the signals shown in OCP's Table 12"), 42 (alleging that "the signals used when a system initiator makes a request for such a service from a system initiator target an address range ('MAddr,' 'MAddrSpace') and a thread ID ('MThreadID')"); EX1006, 38.

OCP is clear that the MThreadID and MAddrSpace signals are *optional* and are not necessary in every OCP request. EX1006, 15 ("[e]ach OCP interface on the

core must ... [c]ontain at least the basic OCP signals,” including “MAddr.”); 23 (“The **optional** dataflow signals are grouped into simple and complex extensions”), 26 (simple extensions include, among others, “MAddrSpace”), 27 (complex extensions include, among others, “MThreadID”); EX2070, ¶¶176, 182. Petitioner’s arguments are flawed because even if a POSITA would have been motivated to use OCP with Rădulescu2004, Petitioner failed to explain why a POSITA would choose to utilize OCP’s **optional** MAddrSpace and MThreadID signals among the many other signals in OCP. *See* Petition, 39-42.

Dr. Hassoun admitted that many of the OCP signals “are optional” and “don’t have to be in every request.” EX2068, 73:1-25. When asked which signals were optional, he initially responded that he would “have to look them up to tell you which ones are optional and which ones are required.” *Id.*, 74:1-4. He eventually confirmed that MAddrSpace is one of the optional signals and that MThreadID is not required. *Id.*, 78:24-79:3, 75:19-21.

Recognizing the shortcomings of his declaration in this regard, Dr. Hassoun repeatedly stated during his deposition that whether the MAddrSpace signal is present “depends on how you architected the system” and that “if you’ve architected the system that that’s a requirement, then that would be a requirement in that system.” EX2068, 77:12-22. Saying that the MAddrSpace signal is required when it is required is a circular non-answer, and Dr. Hassoun’s declaration does not explain

why Rădulescu2004 would be a system in which the MAddrSpace or MThreadID signals are a “requirement.” EX1003, ¶¶154-173.

2. Petitioner Failed to Establish any Motivation to Use OCP's MThreadID or MAddrSpace Signals (Claims 1-7)

Even if, *arguendo*, Petitioner explained why a POSITA would have allegedly used OCP's MAddrSpace and/or MThreadID signals (which it did not), Petitioner failed to establish *why* a POSITA would have been motivated to use those signals as claimed. Petition, 39-42. Claim 6 requires that the “mapping” step is performed “according to said at least one communication service identification.” EX1001, 10:28-32; EX2070, ¶196. Claims 1 and 7 include substantively identical limitations. EX1001, 9:41-45, 10:54-58; EX2070, ¶210.⁸

a. OCP's Optional MThreadID Signal

With respect to the “MThreadID” signal, Petitioner argues that “OCP describes numerous advantages of employing threads” which relate to properties like different burst styles, supporting concurrent activity, out-of-order completion of transfers, and enabling busy targets to prioritize requests. Petition, 38 (citing EX1006, 46, 181), 40-41. Petitioner then argues that “a POSA would have been

⁸ The Petition refers to its analysis for claim 6 for claims 1 and 7. Petition, 45-47.

motivated to use the OCP threads in the system of Rădulescu2004 in order to achieve these known benefits of threading.” Petition, 38-39.

However, Rădulescu2004 *already* has the purported benefits of threading. EX2070, ¶¶206-207. Rădulescu2004 supports different communication properties without using threads. Petition, 38; EX2070, ¶184; EX1005, §1, §2. For example, Rădulescu2004 implements ordering without using threads. EX2070, ¶184; EX1005, 4 §4; EX2068, 100:3-5 (Rădulescu2004 provides in-order response delivery), 140:3-24 (Rădulescu2004 provides in-order request delivery). As another example, Rădulescu2004 implements priority without using threads. EX2070, ¶184; EX1005, 2 §2; EX2068, 98:22-24 (Rădulescu2004 allows for differentiated traffic classes). A POSITA would not be motivated to use OCP's threads in Rădulescu2004's system because the alleged “benefits” are already realized by Rădulescu2004 without OCP's threads. EX2070, ¶¶181-186; *Mylan Pharms. Inc. v. Merck Sharp & Dohme Corp.*, 50 F.4th 147, 156 (Fed. Cir. 2022) (affirming non-obviousness finding because petitioner failed to “advance[] [an] expected or theoretical benefit to making” proposed combination); *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1369 (Fed. Cir. 2012) (finding “no reason to combine the features of both devices” where both “references independently accomplish similar functions” and “each device independently operates effectively”).

Petitioner also argues that “mapping requests to connections according to a communication service identification comprising a Thread ID would have been obvious in view of OCP.” Petition, 43. Petitioner goes on to argue that OCP “describes that requests from a system initiator may include a thread ID” and that the MThreadID “is mapped to a connection identifier (MConnID) during the request phase.” *Id.* Petitioner concludes that “a POSA would have found it obvious for an OCP adapter in the network interface of Rădulescu2004 to map the thread identifiers in requests from system initiator IP cores to connections through Rădulescu2004’s NoC. Petition, 44. However, Petitioner’s conclusory assertions fail to explain *why* it purportedly would have been obvious to use OCP’s MThreadID for the claimed mapping. *Id.*; *Mylan Pharms*, 50 F.4th at 156; *Kinetic*, 688 F.3d at 1369.

Moreover, the Petition fails to explain why a POSITA would be motivated to use OCP’s threads as a “communication service identifier” in Rădulescu2004’s system. Petition, 37-42. A POSITA would not be motivated to do so because Rădulescu2004 teaches “the slave for which the transaction is destined is selected based on the address.” EX1005, 4 §4.2; EX2070, ¶184. A POSITA would understand the Rădulescu2004 discloses a “communication service identifier” in the form of an “address,” and would have no reason to change the “communication service identifier” to a different signal that does the same thing. EX2070, ¶184.

b. OCP's Optional MAddrSpace Signal

While Petitioner cites to OCP's MAddr and MAddrSpace signals throughout its analysis, it does not mention either of these signals in the section of the Petition titled "Motivation to Combine Rădulescu2004 and OCP." *See* Petition, 37-39.

In analyzing limitation [6.pre.2], Petitioner argues that OCP's "MAddr and MAddrSpace identify a system target (i.e., second processing module) and/or a memory region within the system target." Petition, 42. Petitioner then argues that "a POSA would have been motivated to implement the OCP protocol in the system of Rădulescu2004, including its threads and address range teachings, as the Rădulescu2004 expressly identifies OCP as one of the existing protocols with which its NOC is compatible." *Id.* However, Petitioner provides no reason *why* a POSITA would allegedly use the optional MAddrSpace signal in Rădulescu2004. *Id.*; *supra*, §D.1.a. That OCP may be compatible with Rădulescu2004, standing alone, does not mean that it would have been obvious to modify Rădulescu2004 to include a communication service identification comprising an address range. EX2070, ¶176.

In analyzing limitation [6.d], Petitioner argues that "a POSA would have found it obvious for an OCP adapter in the network interface of Rădulescu2004 to map the OCP address signals ('MAddr,' 'MaddrSpace') in requests from system initiator IP cores to connections through Rădulescu2004's NoC." Petition, 43. This conclusory argument is flawed for the same reasons discussed above. *Supra*,

§VI.D.1.a. The closest Petitioner comes to identifying any reason for using OCP's MAddrSpace signal in Rădulescu2004 is by arguing that "mapping address signals to Rădulescu2004's connections enables the NOC to identify which particular slave module is being targeted by a narrowcast communication service request." Petition, 44. However, Rădulescu2004 already allows for "identify[ing] a system target (*i.e.*, second processing module) and/or a memory region within the system target." *Id.*; EX2070, ¶¶176-180. Rădulescu2004 provides that "each transaction is executed by a single slave selected based on the **address** provided in the transaction." EX1005, §4.; EX2070, ¶177. Thus, Rădulescu2004 already provides a means for "identify[ing] a system target" – introducing OCP's MAddrSpace signal in the communication service identification is not necessary to do this. EX2070, ¶177.

With respect to identifying a memory region, Rădulescu2004 states that "[n]arrowcast connections provide a simple, low-cost solution for a single shared address space mapped on multiple memories." EX1005, §4; EX2070, ¶178. Thus, Rădulescu2004 already provides a means for "identify[ing] ... a memory region within the system target" and introducing OCP's MAddrSpace signal is not necessary to do this. Petition, 42; EX2070, ¶178. Because the only alleged "benefits" of introducing OCP's MAddrSpace signal is already realized by Rădulescu2004, a POSITA would not be motivated to combine OCP's MAddr and MAddrSpace

signals in Rădulescu2004's system. EX2070, ¶179. *Mylan*, 50 F.4th at 156; *Kinetic*, 688 F.3d at 1369.

3. Rădulescu2004 and OCP Describe Different Types of "Connections"

OCP is a connectionless communication protocol. EX2070, ¶187; EX1001, 8:47-58 (explaining that protocols like OCP "do not include the notion of connection"). Network-based connections, such as Rădulescu2004's, transmit packets, whereas the "connection" in OCP transmits data in the form of a transaction via the OCP protocol. EX2070, ¶187. OCP cannot transmit packets because it operates in the data link layer and provides a connection ID that is "more like" a transport/session layer of the OSI model. EX1006, 170; EX2070, ¶187. In contrast, packets are transmitted in the networking layer of the OSI model. EX2070, ¶187. The difference between OCP transactions and packet transmission is evident from the disclosure in the '052 Patent. *Id.*; EX1001, 8:47-58.

Because Rădulescu2004's packet transmission and OCP's transactions are fundamentally different, a POSITA would understand that Rădulescu2004's "connections" and OCP's "connections" are different. EX2070, ¶188. Thus, OCP's "connections" cannot be combined with Rădulescu2004's system because it would render Rădulescu2004 inoperable for its intended purpose (i.e., transmitting packet in a network on chip). EX2070, ¶¶188-190; Petition, 43-44; *Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1068 (Fed. Cir. 2016) (combination that "would destroy

the basic objectives of the [invention]" not obvious). This includes OCP's disclosure of "mapping" a connection ID to a thread ID, as incorrectly suggested by Petitioner (Petition, 43-44) because OCP discloses that the "mapping" occurs in the interfaces. EX1006, 47. OCP interfaces are incompatible with Rădulescu2004's network because OCP signals cannot be sent directly over Rădulescu2004's network. EX2070, ¶¶188-190; EX1005, 4 §4.2.

Petitioner also points to OCP's statement that "[a]ny on-chip interconnect can be interfaced to the OCP" as a purported motivation to combine OCP and Rădulescu2004. Petition, 39. A POSITA would not understand that to mean that OCP can natively interface with a NoC. EX2070, ¶191. According to Petitioner, OCP published in 2001. Petition, 3. Rădulescu2004 came later, and NoCs were not commercially available until around 2006. EX2070, ¶191; EX2072, 9. A POSITA would not understand OCP to be saying that it can interface with a NoC like Rădulescu2004. EX2070, ¶191. Indeed, an objective of the '052 Patent is to provide the protocol conversion necessary to use OCP with an NoC. *Id.*

4. Dependent Claims 2-5

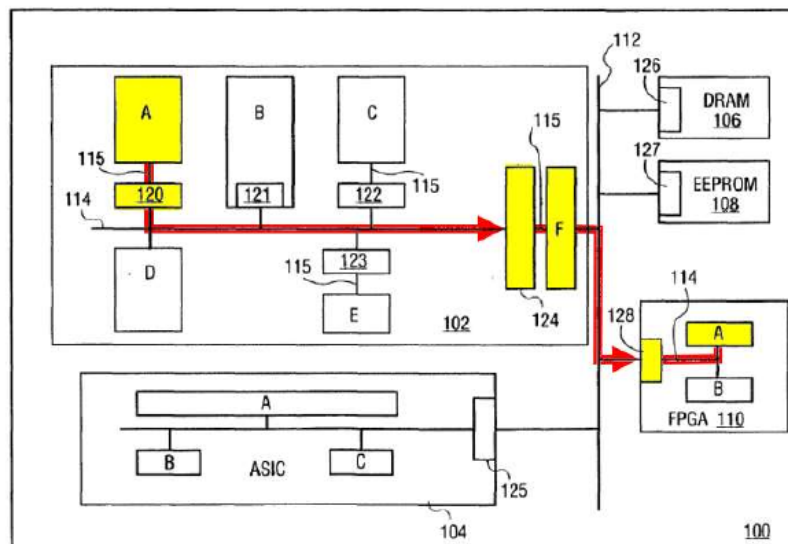
Because claims 2-5 depend from claim 1, Rădulescu2004 in view of OCP does not render obvious claims 2-5 for the same reasons as claim 1. EX2070, ¶210.

E. Petitioner Failed to Meet its Burden for Ground 3

Petitioner failed to meet its burden for Ground 3 because Weber does not disclose (1) an integrated circuit (claims 1-6); (2) the claimed “mapping means” (claims 1-5 and 7); (3) the claimed “interconnect means” (claims 1-7), or (4) the claimed mapping (claims 1-7). EX2070, ¶¶211-283.

1. Weber Does Not Disclose a Single Integrated Circuit (Claims 1-6)

Claims 1-6 recite an “integrated circuit”⁹ which includes the various components in the claims. EX1001, 9:25, 10:7-9; EX2070, ¶¶213-214. For the “interconnect means” limitation, Petitioner relies on communications between Weber’s sub-systems 102 and 110. Petition, 57 (annotating EX1007, FIG. 1).



⁹ Petitioner's arguments fail under either district court construction. *Supra* §V.D.

Weber teaches that the sub-systems in FIG. 1 are *different* integrated circuits. EX1007, ¶[0037] (explaining that 102 “is a fully custom integrated circuit,” 110 “is a field programmable gate array (FPGA), and bus 112 connects “separate integrated circuit chips”); EX2070, ¶¶215-216.

To address this deficiency and the “integrated circuit” requirement in claims 1 and 6, Petitioner argues that “Weber also discloses that the entire system 100 (including functional blocks 102, 104, 106, 108, 110) can be implemented on a single integrated circuit.” Petition, 49 (citing EX1007, ¶¶[0037]-[0038]). Petitioner’s argument is predicated on Weber’s statement that system 100 “may consist of one or more integrated circuits or chips.” EX1007, ¶[0038], Petition, 49; EX1003, ¶¶185, 191. Contrary to Petitioner’s suggestion, this does not mean that sub-systems 102-110 can be implemented on one integrated circuit. EX2070, ¶217. In the preceding paragraph, Weber indicates that while system 100 includes each of “sub-systems 102, 104, 106, 108, and 110,” other “embodiments may also include *fewer subsystems* than the sub-systems shown in system 100.” EX1007, ¶[0037]; EX2070, ¶217. A POSITA would understand that Weber expressly contemplates embodiments containing only one of the sub-systems 102-110. EX2070, ¶217. For example, Weber contemplates an embodiment with sub-system 102 alone. *Id.*

“It is impermissible ... to pick and choose from any one reference only so much of it as will support a given position.” *Bausch & Lomb, Inc. v. Barnes-*

Hind/Hydrocurve, Inc., 796 F.2d 443, 448 (Fed. Cir. 1986). When read in its full context, Weber's statement that the system 100 "may consist of one or more integrated circuits or chips" simply reflects that some embodiments may only include one sub-system (e.g., 102 alone). EX1007, ¶[0037]; EX2070, ¶217. In that case, the system 100 would "consist of one ... integrated circuit[] or chip[]." EX1007, ¶[0038]; EX2070, ¶217. A POSITA would not read Weber to disclose that all of the sub-systems 102-110 (or even a subset of the sub-systems) can be implemented on a single integrated circuit. EX2070, ¶¶217-128.

A POSITA would not understand Weber to disclose a single integrated circuit with all of the sub-systems 102-110 because this would be unusual and highly impractical, especially around the time of the invention. EX2070, ¶219. For example, the DRAM 106 is incompatible with the logic processes of sub-system 102 and ASIC 104. *Id.*, ¶219-225. Implementing DRAM onto the same chip as the other components would increase the die size and cost while lowering performance and also cause thermal management problems. *Id.*, ¶¶219-223. Even today, such an integrated circuit is uncommon and impractical *Id.*, ¶226.

While not argued in the Petition, Dr. Hassoun opines that a POSITA would "at once envisage that system 100 . . . can also be 'an integrated circuit having a plurality processing modules.'" EX1003, ¶191. This conclusory assertion should be afforded no weight. 37 C.F.R. § 42.65(a); *Xerox Corp. v. Bytemark, Inc.*, IPR2022-

00624, Paper 9 at 15–17 (PTAB Aug. 24, 2022) (precedential) (testimony that restates Petitioner's argument without providing "any additional supporting evidence or . . . any technical reasoning" should be afforded no weight). Moreover, for the reasons discussed above, a POSITA would not "at once envisage" an embodiment of Weber with all of the sub-systems on a single integrated circuit because this would be, at best, impractical and unusual. EX2070, ¶¶218-227; *Otonomy, Inc. v. Auris Med., AG*, 743 F. App'x 430, 439 (Fed. Cir. 2018) ("anticipation requires that the reference provide specific guidance that would lead a person of ordinary skill to an embodiment within the claim").

Even reading Weber in a light most favorable to Petitioner, Weber's statement about "one or more integrated circuits or chips" is, at best, ambiguous as to whether Weber contemplates an embodiment in which sub-systems 102-110 are implemented on one integrated circuit and "ambiguous references do not, as a matter of law, anticipate a claim." *Wasica Fin. GmbH v. Cont'l Auto. Sys., Inc.*, 853 F.3d 1272, 1284 (Fed. Cir. 2017).

2. Weber Does Not Disclose the Claimed "Mapping Means (A)" (Claims 1-5 and 7)

As discussed above, Petitioner argues that the term "mapping means (A)" in claims 1 and 7 is a means-plus-function term with a corresponding structure of "adapter unit/shell comprising a sequentializing unit and a desequentializing unit as

disclosed in the '052 Patent as 5:58-6:3, 6:30-7:14, FIGs. 1, 2A, and 2B.” *Supra*, §V.B; Petition, 11.

Petitioner alleges that “Weber’s interface module” corresponds to the claimed “mapping means (A).” Petition, 66. However, Petitioner fails to allege how Weber discloses the corresponding structure required in its claim construction. *Id.* Petitioner first suggests that the “multiplexing” described in Weber “is the same as or equivalent to the ‘sequentializer’ of the ‘052 patent’s adapter/shell units.” Petition, 66. However, Petitioner fails to identify any structure in Weber that allegedly corresponds to the ‘052 patent’s sequentializing unit. *Id.*; EX2070, ¶¶231-232. What is more, Weber teaches that “multiplexing” is “more appropriate for chip-to-chip communications between semiconductor devices.” EX1007, ¶[0036]. Thus, even if, *arguendo*, Weber disclosed all of the sub-systems on one integrated circuit (which it does not), Weber discloses that “multiplexing” is not appropriate for an embodiment where there is only one IC (as opposed to multiple ICs). EX2070, ¶232.

Additionally, the Petition is silent with respect to the “desequentializing unit” structure and functionality required in Petitioner’s claim construction. Petition, 66; EX2070, ¶231. To the extent Petitioner’s argument that Weber’s multiplexing would occur “on the shared communication buses 112, 114” was meant to identify Weber’s buses as the corresponding structure, neither is a sequentializing or desequentializing unit. EX2070, ¶233. In the ‘052 Patent claims, the “mapping means” a separate and

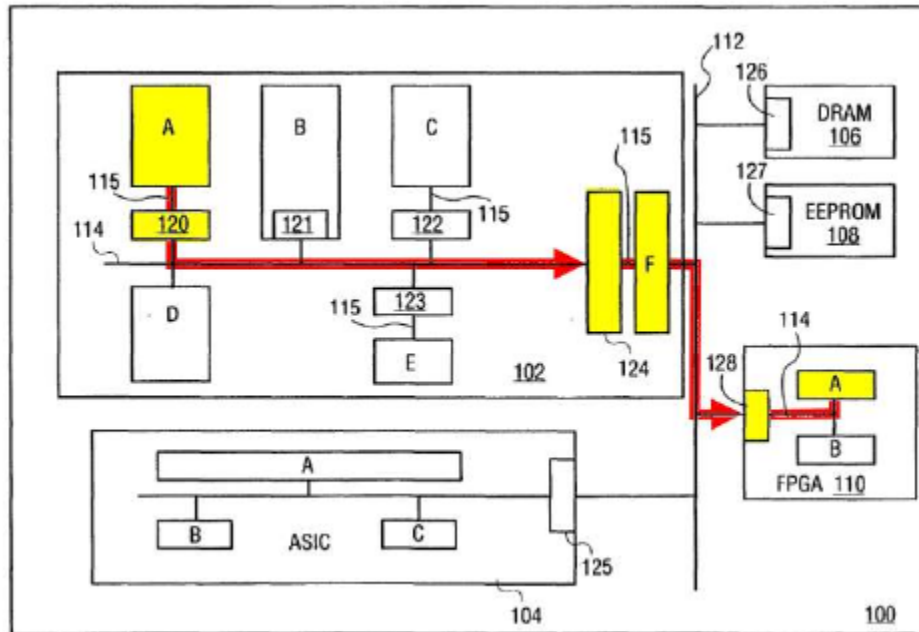
distinct structure from the “interconnect means,” and Petitioner elsewhere identifies Weber’s buses as the claimed “interconnect means.” *Id.*

3. Weber Does Not Disclose the Claimed “Interconnect Means” (Claims 1-7)

The proper construction of “interconnect means (N)” is a “multi-hop interconnect between modules separated by one or more network nodes.” *Supra* §V.A. And even if “interconnect means” is subject to § 112, ¶ 6, the corresponding structure is a network, which is a “multi-hop interconnect between modules separated by one or more network nodes.” *Id.*

Based on its erroneously broad claim construction, Petitioner alleges that Weber’s “shared communication bus” corresponds to the claimed “interconnect means (N).” Petition, 54-56. Weber’s shared communication buses do not constitute a network, i.e., a multi-hop interconnect separated by one or more network nodes. EX2070, ¶255; Paper 11, 42 (recognizing that the Petition does not address whether Weber discloses a network). Rather, Weber’s bus architecture is an example of the traditional interconnects that the ‘052 Patent expressly disparages and differentiates itself from. EX1001, 1:48-58, 2:31-42; EX2070, ¶¶255-275.

In attempt to read Weber’s traditional shared bus onto the claims, Petitioner annotates FIG. 1 of Weber and claims that the red arrows represent “hops.” Petition, 56.



EX1007, FIG. 1 (annotated)

This argument is flawed for several reasons.

First, the claimed interconnect means must implement a “multi-hop” scheme, where a “hop” is a router or switch traversed by a packet originating from an arbitrary protocol. *Supra*, §V.A; EX2070, ¶254. Even if *arguendo*, the multiple branches in FIG. 1 of Weber annotated by Petitioner with red arrows are considered indirect connections separated by one or more network nodes (which they are not), Weber does not transmit packets. EX2070, ¶¶262, 269; EX2068, 116:14-20, 116:25-117:5, 121:11-13, 145:8-12.

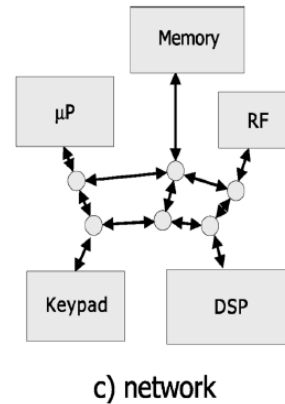
Second, Petitioner failed to show that Weber discloses “network nodes.” To this point, Petitioner argues that “a POSA would have understood that ... Weber indicates that system 100 *may* include a bridge, which a POSA would understand is

a ‘network node’ that serves as an interface between busses.” Petition, 56. To the contrary, a POSITA would not understand Weber’s functional block F to be a “network node.” EX2070, ¶¶261-263. Weber does not disclose, any networking components, such a router or a switch. *See* EX1007; EX2070, ¶262. Moreover, a POSITA would understand that a “network node” communicates in a network-based communication protocol, such as NTTP. EX2070, ¶111.

A POSITA would understand that Weber’s functional block F is not a “network node” because Weber does not disclose conversion between the communication protocol used by the functional blocks to a different communication protocol used by the alleged “network node.” EX2070, ¶262. As explained in the specification, the “network” sends data in a different protocol from that of the master and slave modules. EX1001, 6:30-38, 8:47-58, 6:61-64; EX2070, ¶261. Weber’s failure to disclose conversion between packet-based protocol and the protocol used by the IP modules further evidences that Weber does not disclose an “interconnect means.” EX2070, ¶262. Moreover, because Weber does not disclose the “interconnect means,” it does not disclose the claimed “network interface.” EX2070, ¶¶276-282.

Third, the fact that Weber includes two shared buses (rather than only one) does not convert it into a multi-hop network. EX2070, ¶264. In Weber, the connection between the initiator functional block A in sub-system 102 and the target

EX2070, ¶263.



EX2073, 8

hop interconnect. EX2070, ¶¶264-266.

once envisage' the claimed method.” Petition, 47 n.7. This conclusory assertion is

insufficient to establish that a POSITA would envisage an embodiment combining FIGS. 1 and 14 in Weber.

In any event, Weber's Figure 14 suffers from the same deficiencies as Figure 1: (1) there is no disclosure of packet-based communication and does not implement the "multi-hop" scheme; and (2) there are no network nodes. EX2070, ¶¶268-274. While not argued in the Petition, Dr. Hassoun opines that a POSITA "would also envisage that the communication sub-systems 1435 and 1440 would be routers or respective shared buses (e.g., 112, 144) of system 100." EX1003, ¶204. Nothing in Weber discloses or suggests using routers or switches. EX2070, ¶262; EX2068, 116:9-13. A router or switch would make decisions on where to send data, whereas Weber's communication subsystems do not because they are "loaded with a mapping." EX1007, ¶[0111]; EX2070, ¶¶273-274. Nothing in Weber suggests that the communication subsystems in FIG. 14 would perform that "mapping." *Id.*

4. Weber Does Not Disclose the Claimed "Address Range" (Claims 1-7)

As the Board found in the Institution Decision, Weber does not disclose an "address range" because even if Dr. Hassoun's opinions are taken "as true, it still would not establish that the communication identification itself includes an address range." Paper 11, 41. Weber states that the request can include an "Addr" signal which is "an indication of a particular resource that an initiator functional block wishes to access." EX1007, ¶[0080]. A POSITA would understand the "Addr" signal

to be an “address,” *not* an “address range.” EX2070, ¶¶238-240; *supra*, §VI.C.1; EX2068, 120:15-18.

Recognizing this deficiency in Weber, Dr. Hassoun opines that Weber has the “*capability* of issuing a request based on an address range.” EX1003, ¶193; EX2070, ¶240. Even if that were true, the fact that Weber allegedly has the “capability” of issuing a request comprising an address range does not establish that Weber discloses this limitation. EX2070, ¶¶241-251.

5. Dependent Claims 2-5

Because claims 2-5 depend from claim 1, Weber does not anticipate claims 2-5 for the same reasons as claim 1. EX2070, ¶283.

F. Petitioner Failed to Meet its Burden for Ground 4

Petitioner failed to meet its burden for Ground 4 because: (1) the proposed Weber and Rădulescu2004 does not address the deficiencies in Weber and (2) a POSITA would not be motivated to combine Weber and Rădulescu2004 as proposed. EX2070, ¶¶284-323.

1. Rădulescu2004 Does Not Cure the Deficiencies in Weber (Claims 1-6)

As discussed above, Weber does not expressly disclose a single integrated circuit. *Supra*, §VI.E.1. Petitioner purports to argue that any limitations “not expressly disclosed by Weber or not arranged as claimed ... would be rendered obvious by Weber on its own or in view of Rădulescu2004. Petition, 68. However,

Petitioner does not argue in Ground 4 that it would be obvious to modify Weber so that the sub-systems 102-110 would be implemented on a single integrated circuit. *See* Petition, 68-76. Accordingly, Weber's lack of a single integrated circuit is fatal to Ground 4; EX2070, ¶¶286-287.

2. A POSITA Would Not Have Combined Weber and Rădulescu2004 (Claims 1-7)

Petitioner posits that a POSITA would have been motivated to combine Weber and Rădulescu2004 “in order to create SoCs with greater scalability and performance.” Petition, 68. Neither reason supplies a motivation to modify Weber with Rădulescu2004. EX2070, ¶¶288-304.

With respect to scalability, Petitioner ignores Weber's disparagement of traditional buses with respect to scalability, and its teaching that its solution “meet[s] the requirements of today's large, complex electronics subsystems.” EX1007, ¶[0009]; EX2070, ¶293; EX2068, 104:23-105:7. Dr. Hassoun defined scalability in terms of whether the interconnect is “suitable for systems with a large number of cores or functional blocks.” EX1003, ¶239. Weber teaches that its shared-bus is already suitable for systems with a large number of cores or functional blocks and therefore is already scalable. EX2070, ¶293. A POSITA would not recognize any scalability problem in Weber that would motivate them to look to Rădulescu2004. *Arctic Cat Inc. v. Polaris Indus., Inc.*, 795 F.App'x 827, 833 (Fed. Cir. 2019) (finding

no motivation to combine because petitioner “tried to create a problem with the prior art in hopes of creating a motivation to combine references, but it failed”).

Because there is no teaching or suggestion that Weber lacks scalability, Petitioner points to Rădulescu2004's statement that “NoCs ... scale better than buses.” Petition, 69-70; EX1005, 1. But Dr. Hassoun testified the advantages NoCs provide are relative to “a single bus [used] to communicate with a number of modules” and not necessarily shared-buses like Weber's because “it depends on the architecture of the bus you're talking about and the architecture of the NoC you're talking about.” EX2068, 20:11-17. There is no evidence that Rădulescu2004 would provide a scalability benefit relative to Weber, especially in view of Weber's teachings that it is already scalable. EX1007, ¶[0009]; EX2070, ¶293.

With respect to “performance,” Petitioner alleges that “Rădulescu2004's NoC can support many concurrent data transmissions, thus enabling a large amount of data to be communicated between the various modules and blocks in an SoC.” Petition, 69-70. But Weber already allows for concurrent data transmissions. EX2070, ¶¶294-295; EX1007, ¶¶[0070]-[0071], [0006]. There would be no reason to modify Weber with Rădulescu2004's NoC to provide concurrent data transmissions when Weber already allows for this. EX2070, ¶¶294-295. Petitioner is again unsuccessful in trying “to create a problem with the prior art in hopes of creating a motivation to combine references.” *Arctic Cat*, 795 F.App'x at 833.

The benefits to using NoCs relative to traditional buses were already realized by Weber's shared-bus interconnect. EX2070, ¶299; EX1007, ¶¶[0001]-[0009]; EX1003, ¶¶236-238. According to Petitioner, "Weber and Rădulescu2004 both have the same general goal." EX1003, ¶236. A POSITA would not be motivated to combine Rădulescu2004 and Weber because they address the same problems, teach the same concepts, and independently accomplish similar functions effectively. *Kinetic*, 688 F.3d at 1369 (finding "no reason to combine the features of both devices" where both "references independently accomplish similar functions" and "each device independently operates effectively").

Further, in an obviousness analysis, "the benefits, both lost and gained, should be weighed against one another." *Winner Int'l Royalty Corp. v. Wang*, 202 F.3d 1340, 1349 n.8 (Fed. Cir. 2000); *Arctic Cat*, 795 F. App'x at 833. Petitioner's own evidence indicates that there were many known disadvantages to using an NoC like Rădulescu2004's compared to a bus. EX1021, 8; EX2070, ¶301; EX2068, 134:9-136:24.

Bus Pros & Cons		Network Pros & Cons	
Every unit attached adds parasitic capacitance, therefore electrical performance degrades with growth.	-	+	Only point-to-point one-way wires are used, for all network sizes.
Bus timing is difficult in a deep submicron process.	-	+	Network wires can be pipelined because the network protocol is globally asynchronous.
Bus testability is problematic and slow.	-	+	Dedicated BIST is fast and complete.
Bus arbiter delay grows with the number of masters. The arbiter is also instance-specific.	-	+	Routing decisions are distributed and the same router is reinstanced, for all network sizes.
Bandwidth is limited and shared by all units attached.	-	+	Aggregated bandwidth scales with the network size.
Bus latency is zero once arbiter has granted control.	+	-	Internal network contention causes a small latency.
The silicon cost of a bus is near zero.	+	-	The network has a significant silicon area.
Any bus is almost directly compatible with most available IPs, including software running on CPUs.	+	-	Bus-oriented IPs need smart wrappers. Software needs clean synchronization in multiprocessor systems.
The concepts are simple and well understood.	+	-	System designers need <i>reeducation</i> for new concepts.

Table 3: The bus-versus-network arguments

EX1021, 8

Petitioner failed to weigh any of these known disadvantages in its proposed obviousness combination. *See* Petition, 68-71.

In particular, one disadvantage to using an NoC is that “[t]he network has a significant silicon area,” whereas “[t]he silicon cost of a bus is near zero.” EX1021, 8; EX2070, ¶302. One of Weber’s stated objectives is ensuring low “physical size and cost per function” in SoCs and proposes a shared-bus to meet “form-factor requirements.” EX1007, ¶¶[0002]-[0003]; EX2070, ¶302; EX2068, 101:7-102:8. Weber’s objective of minimizing the form factor would have dissuaded a POSITA from introducing Rădulescu2004’s NoC, which would increase the form factor. EX2070, ¶302. Dr. Hassoun did not consider these issues. EX2068, 102:15-24.

Additionally, a POSITA would recognize that an NoC would be more costly and complicated than Weber’s buses. EX2070, ¶¶303-304; EX2021, 8. Dr. Hassoun admitted that he did not consider the relative cost and complexity of

Rădulescu2004's NoC relative to Weber. EX2068, 136:25-138:6. This is further evidence a POSITA would not combine Weber and Rădulescu2004, especially because Petitioner has not identified any problem with Weber that would prompt a POSITA to consider Rădulescu2004. EX2070, ¶¶303-304.

3. Petitioner's Proposed Combination(s) Are Flawed

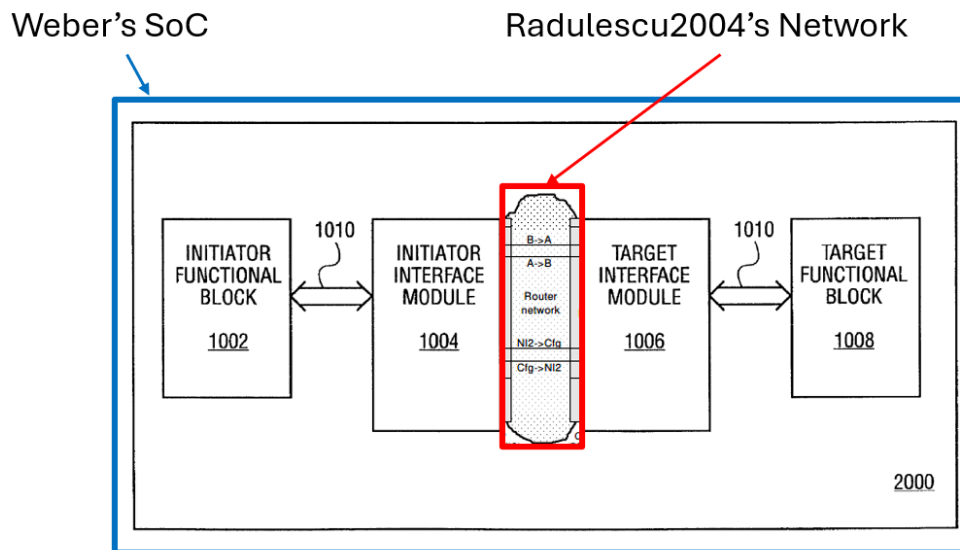
Petitioner generically asserts that a POSITA would combine Rădulescu2004 with Weber but does not define the resulting combination. Petition, 68-71. When asked to do so, Dr. Hassoun testified that a POSITA “looking at the architectures of the two would know what to do” and “would know to make the appropriate replacement where necessary.” EX2068, 125:4-128:9. He testified one possible combination would use Rădulescu2004's network interfaces, while another would not. *Id.*, 128:5-9. When asked when a POSITA would make each of these combinations, he generically responded that “[i]t's an architectural decision” and could not identify any advantages of one over the other. *Id.*, 127:10-128:21.

The Board should find that Petitioner failed to meet its burden because it did not specifically explain “*how* or why the references would be combined to produce the claimed invention.” *Hyundai Motor Co. v. Blitzsafe Texas, LLC*, IPR2016-01476, Paper 12 at 32 (PTAB Jan. 24, 2017). The lack of specificity in the Petition demonstrates the hindsight inherent Petitioner's arguments. *ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1327 (Fed. Cir. 2012) (finding that

“conclusory statement that a person of ordinary skill in the art would have known ... how to combine any of a number of references to achieve the claimed inventions” was “fraught with hindsight bias”).

a. Petitioner's First Combination Fails

One combination suggested by Dr. Hassoun involves Rădulescu2004's network without Rădulescu2004's network interfaces combined with Weber's functional blocks and interface modules, as shown below. EX2070, ¶307.



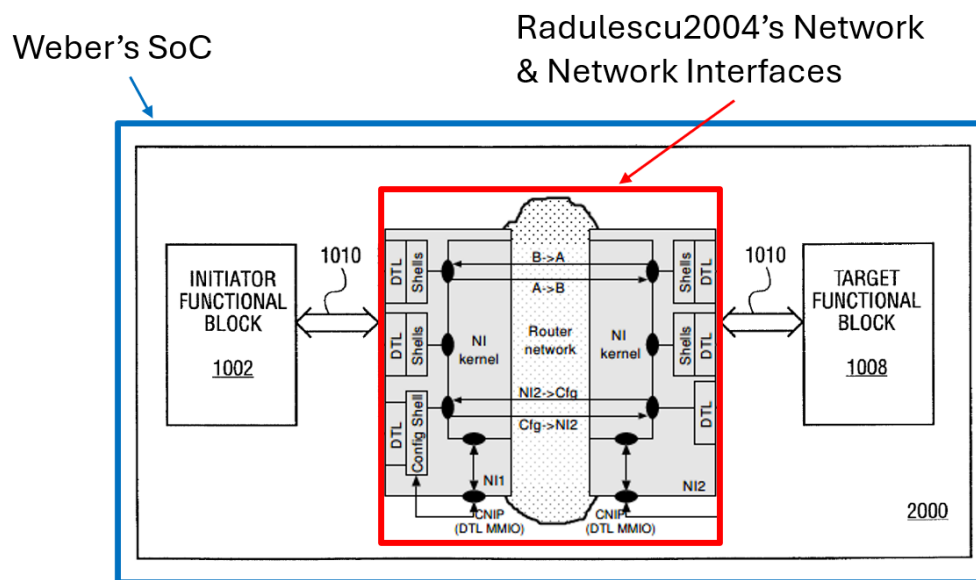
EX1005, FIG. 8 (annotated); EX1007, FIG. 4 (annotated)

A POSITA would not be motivated to make this combination and have no expectation of success in doing so because Weber's interfaces communicate in a different communication protocol than Rădulescu2004's network. EX2070, ¶¶306-310; EX1007, ¶[0049]; EX1005, 3 §4. Weber's interfaces are incapable of performing the conversion from the communication protocol of the initiators 1002

to the packet-based protocol of Rădulescu2004's network. EX2070, ¶¶308-309. A POSITA would not make this combination because it would render the resulting SoC inoperable and would not have any expectation of success. *Id.*, ¶310.

b. Petitioner's Second Combination Fails

Dr. Hassoun also suggests that a POSITA would replace Weber's buses with Rădulescu2004's NoC, including its network interfaces. EX1003, ¶241.



EX1005, FIG. 8; EX1007, FIG. 4 (annotated)

Even if, *arguendo*, Weber and Rădulescu2004 were combined in this manner (which a POSITA would not do – *supra* §VI.F.2), the combination is flawed.

First, neither Rădulescu2004 nor Weber discloses or suggests a communication service identification including an address range. *Supra*, §§VI.C.1, VI.E.4; EX2070, ¶¶316-317. To the extent Petitioner suggests that using an address range would nevertheless be obvious, the only benefit to using an address range for

this purpose that Dr. Hassoun identified was that the address range would identify a target or memory within the target. EX2070, ¶318. But Rădulescu2004 already discloses that this functionality is possible without there being an address range in the communication service identification. *Id.*

Second, Rădulescu2004 does not disclose a communication thread. *Supra*, §VI.C.1. Even if Weber does, the only reasoning Petitioner provides as to why a POSITA would combine that with Rădulescu2004 is to allow for thread-based ordering and priority. EX1003, ¶¶249-250. But Rădulescu2004's network already provides ordering and priority without using threads, meaning that a POSITA would not be motivated to introduce threads for that purpose. EX2070, ¶¶319-321; *Mylan Pharms*, 50 F.4th at 156; *Kinetic*, 688 F.3d at 1369.

Third, Rădulescu2004 does not disclose the claimed mapping. *Supra*, §VI.C.2. Thus, the resulting Rădulescu2004-Weber combination would suffer from the same deficiency as Rădulescu2004. EX2070, ¶322. Petitioner does not assert that it would have been obvious to modify Rădulescu2004 to include this functionality. *See* Petition, 68-72. Moreover, Weber does not disclose or suggest the "mapping" because Weber uses a bus-based protocol that does not include the notion of connection. EX2070, ¶322.

VII. CONCLUSION

For the foregoing reasons, Petitioner failed to establish that any challenged claim of the '052 Patent is unpatentable.

Respectfully submitted,

Dated: September 30, 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 13,978 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 September 30, 2024.

Dated: September 30, 2024

By: /s/ Jennifer Hayes
Lead Counsel for Patent Owner

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing **Patent Owner's Response** was served on September 30, 2024, via email:

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