

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 NOTICE OF APPEAL

Pursuant to at least 35 U.S.C. §§ 141(c) and 142 and 37 C.F.R. §§ 90.2(a) and 90.3, notice is hereby given that Patent Owner Network System Technologies, LLC (“Patent Owner”) appeals to the United States Court of Appeals for the Federal Circuit from the Final Written Decision dated June 13, 2025 (Paper No. 65) (“Final Written Decision”) (attached as Exhibit A) and the Decision Denying Patent Owner's Request on Rehearing of Final Written Decision dated October 9, 2025 (Paper No. 67) (“Rehearing Decision”) (attached as Exhibit B), and from all underlying findings, orders, decisions, rulings, and opinions regarding U.S. Patent No. 7,594,052 (“the '052 patent”) entered in the above-captioned proceeding before the Patent Trial and Appeal Board (“Board”).

Pursuant to 37 C.F.R. § 90.3, this Notice of Appeal is timely, having been filed no later than 63 days after the Rehearing Decision.

For the limited purpose of providing the Director of the United States Patent and Trademark Office with the information requested under 37 C.F.R. § 90.2(a)(3)(ii), Patent Owner submits that the appeal will address aspects of the Board's decision purporting to conclude that Petitioner has demonstrated, by a preponderance of the evidence, that claims 1-7 of the '052 patent are unpatentable. In particular, the issues on appeal may include, but are not limited to:

- Whether claims 1-7 of the '052 patent are unpatentable under 35 U.S.C. § 103 in view of Rădulescu2004 (Ex. 1005) and OCP (Ex. 1006), including any findings or determinations supporting or related to those issues; and
- All other issues decided adversely to Patent Owner in any orders, decisions, rulings, or opinions in this proceeding.

Pursuant to 35 U.S.C. § 142 and 37 C.F.R. § 90.2(a), this Notice of Appeal is being filed with the Director of the United States Patent and Trademark Office, and a copy of this Notice of Appeal is being concurrently filed with the Board. In addition, pursuant to Federal Circuit Rule 15, a copy of this Notice of Appeal is being concurrently filed with the Clerk of the United States Court of Appeals for the Federal Circuit, along with payment of the required docketing fee. Petitioner is also being served with a copy of this Notice of Appeal.

Respectfully submitted,

Dated: November 14, 2025

By: /s/ Jennifer Hayes

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IPR2024-00343

U.S. Patent No. 7,594,052

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing **Patent Owner's**

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IPR2024-00343

U.S. Patent No. 7,594,052

CERTIFICATE OF SERVICE

The undersigned hereby certifies that, on November 14, 2025, the foregoing Patent Owner's Notice of Appeal was electronically filed through the Patent Trial and Appeal Board's Patent Review Processing System and additionally filed with the Director of the United States Patent and Trademark Office via Priority Mail Express overnight delivery to the following address:

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IPR2024-00343

U.S. Patent No. 7,594,052

CERTIFICATE OF SERVICE

The undersigned hereby certifies that, on November 14, 2025, the foregoing Patent Owner's Notice of Appeal was electronically filed with the Clerk's Office of the United States Court of Appeals for the Federal Circuit via the CM/ECF filing system and that the filing fee was paid.

By: /s/ Jennifer Hayes

Lead Counsel for Patent Owner

EXHIBIT A

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

QUALCOMM INCORPORATED,
Petitioner,

v.

NETWORK SYSTEM TECHNOLOGIES, LLC,
Patent Owner.

IPR2024-00343
Patent 7,594,052 B2

Before CHARLES J. BOUDREAU, STEVEN M. AMUNDSON, and
IFTIKHAR AHMED, *Administrative Patent Judges*.

BOUDREAU, *Administrative Patent Judge*.

JUDGMENT

Final Written Decision

Determining All Challenged Claims Unpatentable

Dismissing Patent Owner's Motion to Submit Supplemental Information

Dismissing Petitioner's Motion to Exclude Evidence

35 U.S.C. § 318(a)

I. INTRODUCTION

Qualcomm Incorporated (“Qualcomm” or “Petitioner”) and Samsung Electronics Co., Ltd. (“Samsung”) filed a Petition to institute an *inter partes* review of claims 1–7 (the “challenged claims”) of U.S. Patent No. 7,594,052 (Ex. 1001, the “’052 patent,” “challenged patent”) pursuant to 35 U.S.C. § 311 *et seq.* Paper 3 (“Pet.”). Network Systems Technologies, LLC (“Patent Owner”) filed a Preliminary Response. Paper 7 (“Prelim. Resp.”). With the Board’s authorization, Qualcomm and Samsung filed a Preliminary Reply (Paper 9, “Prelim. Reply”), and Patent Owner filed a Preliminary Sur-reply (Paper 10, “Prelim. Sur-reply”). After considering the Petition, Preliminary Response, Preliminary Reply, Preliminary Sur-reply, and the evidence of record, the Board instituted an *inter partes* review of the challenged claims on June 21, 2024. Paper 11 (“Dec.”).

After institution, Samsung and Patent Owner reported that they had entered into a confidential settlement agreement resolving the dispute between them, and the Board granted a joint motion to terminate Samsung from this proceeding pursuant to 35 U.S.C. § 317 and 37 C.F.R. § 42.74. Paper 25.

Thereafter, Patent Owner filed a Response to the Petition (Paper 38, “PO Resp.”), Qualcomm filed a Reply (Paper 48, “Reply”), and Patent Owner filed a Sur-reply (Paper 55, “Sur-reply”). Patent Owner also filed a Motion to Submit Supplemental Information (Paper 45), in response to which Qualcomm filed an Opposition (Paper 46); and Qualcomm also filed a Motion to Exclude (Paper 56), in response to which Patent Owner filed an Opposition (Paper 58), and Qualcomm filed a Reply (Paper 59).

We held an oral hearing in this proceeding on March 20, 2025, and the transcript is entered into the record. Paper 64.

This is a final written decision under 35 U.S.C. § 318(a) as to whether the claims challenged in the *inter partes* review are unpatentable. For the reasons discussed below, we conclude that Qualcomm has established by a preponderance of the evidence that all of the challenged claims are unpatentable. Additionally, we dismiss Patent Owner’s Motion to Submit Supplemental Information and Qualcomm’s Motion to Exclude.

II. BACKGROUND

A. *Real Parties in Interest*

In the Petition, Qualcomm and Samsung identified Qualcomm Incorporated, Qualcomm Technologies, Inc., Samsung Electronics Co., Ltd., Samsung Semiconductor, Inc., Samsung Electronics America, Inc., and Samsung Austin Semiconductor, LLC as real parties in interest for Petitioner. Pet. 79.¹ Network System Technologies, LLC identifies itself as the real party in interest for Patent Owner. Paper 42, 2 (Patent Owner’s Updated Mandatory Notices).

B. *Related Matters*

The parties identify *Network System Technologies, LLC v. Samsung Electronics Co.*, 2:22-cv-00481 (E.D. Tex.) (the “Samsung litigation”); *Network System Technologies, LLC v. Qualcomm Inc.*, 1:22-cv-01331 (W.D. Tex.) (the “Qualcomm litigation”); *Network System Technologies, LLC v. Texas Instruments Inc.*, 2:22-cv-00482 (E.D. Tex.) (the “TI litigation”); *Network System Technologies, LLC v. Lenovo Group Ltd.*, 2:23-cv-00167 (E.D. Tex.) (the “Lenovo litigation”); *Network System Technologies, LLC v. Ford Motor Co.*, 2:23-cv-00440 (E.D. Tex.) (the “Ford litigation”); and

¹ As noted above, Samsung entered into a settlement agreement with Patent Owner and was dismissed from this proceeding.

Network System Technologies, LLC v. OnePlus Technology (Shenzhen) Co., 2:23-cv-00520 E.D. Tex.) (the “OnePlus litigation”) as related matters. Pet. 79–80; Paper 5, 2 (Patent Owner’s Mandatory Notices). We understand that the Samsung, TI, OnePlus, Lenovo, and Ford litigations have been dismissed. See Paper 42, 2 (Patent Owner’s Updated Mandatory Notices).

Patent Owner also identifies as related matters *Qualcomm Inc. v. Network Systems Technologies, LLC*, IPR2024-00338, and *Qualcomm Inc. v. Network Systems Technologies, LLC*, IPR2024-01801, involving the same parties as the instant proceeding. Paper 42, 2 (Patent Owner’s Updated Mandatory Notices). Both of those proceedings concern U.S. Patent No. 7,373,449 B2, which names the same inventors as the ’052 patent and involve related technology but issued from an unrelated application.

C. The ’052 Patent

The ’052 patent, titled “Integrated Circuit and Method of Communication Service Mapping,” names as inventors Andrei Radulescu and Kees Gerard Willem Goossens and relates to “an integrated circuit having a plurality of processing modules and an interconnect means for coupling said plurality of processing modules and a method for communication service mapping in such an integrated circuit.” Ex. 1001, codes (54), (75), 1:6–10. In particular, the ’052 patent describes “systems on chip, i.e. a plurality of modules on the same chip (including e.g. system in a package, multi-die modules) or on different chips, communicate with each other via some kind of interconnect.” *Id.* at 4:43–46. The described interconnect “is embodied as a network on chip NOC, allowing communication between all aforementioned modules.” *Id.* at 4:46–48.

Figure 1 of the '052 patent is shown below:

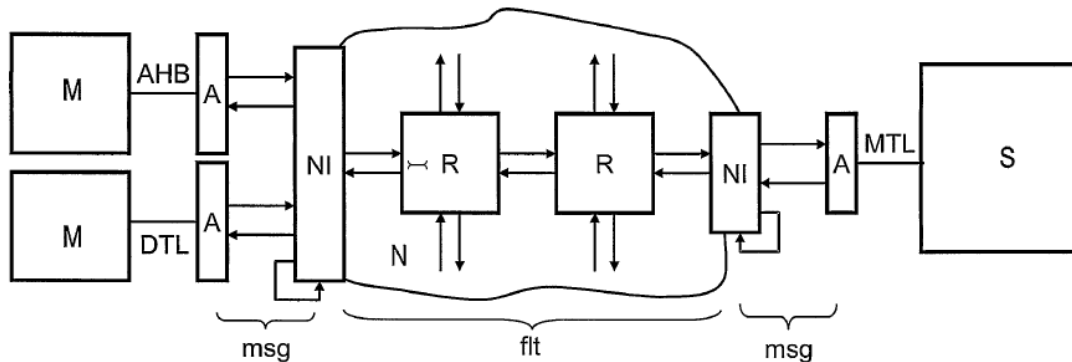


FIG.1

Figure 1 above “shows a basic block diagram of a network on chip.”

Ex. 1001, 4:30–32. This figure depicts “two master modules M and a slave module S each with an associated network interface NI.” *Id.* at 5:8–9.

“Between network interfaces and its associated master M and slave S an adapter unit A is arranged, respectively.” *Id.* at 5:10–11. “The network N may be comprised of a plurality of interconnected network routers R.” *Id.* at 5:25–26.

Figure 4 of the '052 patent is shown below:

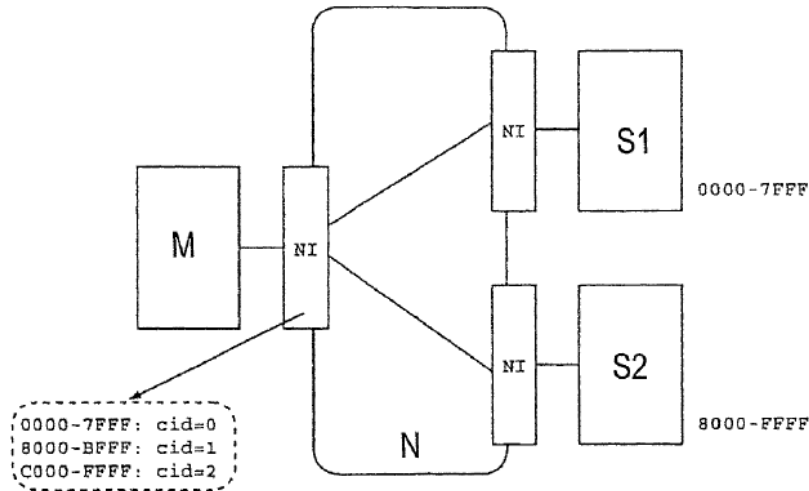


FIG.4

Figure 4 above “shows a basic block diagram of a network on chip for illustrating the operation of the mapping of IP block communication via address ranges to connections.” *Id.* at 8:7–9. “The network on chip comprises a master M and two slaves S1, S2 each being connected to a network via a network interface NI, respectively.” *Id.* at 8:9–12. “The two slaves S1, S2 are implemented as memories, wherein the first slave S1 comprises the address range 0000-7FFF and the second slave S2 comprises the address range 8000-FFFF.” *Id.* at 8:12–15. Accordingly, the network interface NI associated to the master M “may map the communication to the first slave S1, i.e.,] to the address range 0000-7FFF, to a connection with the connection id cid=0 and the communication to the second s[la]ve S2, i.e.,] to the address range 8000-FFFF, to a connection with the connection id cid=1.” *Id.* at 8:15–20.

D. Challenged Claims

Petitioner challenges claims 1–7. Pet. 1. Claims 1, 6, and 7 are independent and read as follows:

1.² [1.pre] Integrated circuit, comprising:

- [1.a] a plurality of processing modules (M, S), [1.b] wherein at least one first of said processing modules (M) requests at least one communication service to at least one second processing module (S) based on specific communication properties and at least one communication service identification,
- [1.c] an interconnect means (N) for coupling said plurality of processing modules (M, S) and for enabling a connection based communication having a set of connection properties,
- [1.d] at least one network interface (NI) associated to said at least one first of said processing modules for controlling the communication between said at least one first of said plurality of processing modules (M) and said interconnect means (N), and
- [1.e] a mapping means (A) for mapping the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties according to said at least one communication service identification, [1.f] wherein said at least one communication service identification comprises at least one communication thread or at least one address range, said address range for identifying one or more second processing modules (S) or a memory region within said one or more second processing modules (S).

² For ease of reference, we include bracketed designations provided in the Petition for the preamble recitations and limitations of claims 1, 6, and 7. Pet. 83–86.

6. [6.pre.1] Method of communication service mapping in an integrated circuit, having a plurality of processing modules (M, S),
 - [6.pre.2] wherein at least one first of said processing modules (M) requests at least one communication service to at least one second processing module (S) based on specific communication properties and at least one communication service identification, wherein said at least one communication service identification comprises at least one communication thread or at least one address range, said address range for identifying one or more second processing modules (S) or a memory region within said one or more second processing modules (S), comprising the steps of:
 - [6.a] coupling said plurality of processing modules (M, S) by an interconnect means (N) and
 - [6.b] enabling a connection based communication having a set of connection properties,
 - [6.c] controlling the communication between said at least one first of said plurality of processing modules (M) and said interconnect means (N) by at least one network interface (NI) associated to said at least one first of said processing modules,
 - [6.d] 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.
7. [7.pre] Data processing system, comprising
 - [7.a] a plurality of processing modules (M, S), [7.b] wherein at least one first of said processing modules (M) requests at least one communication service to at least one second processing module (S) based on specific communication properties and at least one communication service identification, [7.c] wherein said at least one communication service identification comprises at least

one communication thread or at least one address range, said address range for identifying one or more second processing modules (S) or a memory region within said one or more second processing modules (S),

[7.d] an interconnect means (N) for coupling said plurality of processing modules (M, S) and for enabling a connection based communication having a set of connection properties,

[7.e] at least one network interface (NI) associated to said at least one first of said processing modules for controlling the communication between said at least one first of said plurality of processing modules (M) and said interconnect means (N), and

[7.f] a mapping means (A) for mapping the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties according to said at least one communication service identification.

Ex. 1001, 9:24–50, 10:7–59.

E. Challenges to Patentability and Prior Art

Petitioner challenges claims 1–7 based on the grounds in the table below:

Ground	Claim(s) Challenged	35 U.S.C. § ³	Reference(s)
1	1, 2, 5–7	102	Rădulescu2004 ⁴
2	1–7	103	Rădulescu2004, OCP ⁵
3	1–7	102	Weber ⁶
4	1–7	103	Weber, Rădulescu2004

Pet. 3–4

In support of the Petition and Reply, Petitioner submitted declarations with proffered expert testimony from Dr. Marwan Hassoun (Exs. 1003, 1030). In support of the Response, Patent Owner submitted a declaration with proffered expert testimony from Dr. Nader Bagherzadeh (Ex. 2070).⁷

³ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. §§ 102 and 103, effective March 16, 2013. Because the ’052 patent issued from an application filed before that date, we refer to the pre-AIA versions of §§ 102 and 103.

⁴ A. Rădulescu et al. “*An Efficient On-Chip Network Interface Offering Guaranteed Services, Shared-Memory Abstraction, and Flexible Network Configuration*,” Proceedings of the Design, Automation and Test in Europe Conference and Exhibition, 2004 (Ex. 1005).

⁵ Open Core Protocol Specification, Release 1.0, OCP-IP Association (2001) (Ex. 1006).

⁶ U.S. Patent Publication No. 2002/0129173 A1 (Ex. 1007).

⁷ With its Preliminary Response, Patent Owner submitted a declaration with proffered expert testimony from Dr. Erik Chmelar (Ex. 2002). Patent Owner subsequently withdrew its reliance on Dr. Chmelar’s declaration. PO Resp. 1 n.1.

Transcripts of depositions of Dr. Hassoun (Exs. 2068, 2084) and Dr. Bagherzadeh (Ex. 1050) have been filed in the record.

III. ANALYSIS

A. Legal Standards

In an *inter partes* review, a petitioner bears the burden of persuasion to prove “unpatentability by a preponderance of the evidence.” *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (quoting 35 U.S.C. § 316(e)). This burden never shifts to Patent Owner. *Dynamic Drinkware*, 800 F.3d at 1378 (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–27 (Fed. Cir. 2008)). Petitioner must explain with particularity how the prior art would have rendered the challenged claims unpatentable. 35 U.S.C. § 312(a)(3); 37 C.F.R. § 42.104(b)(4) (“The petition must specify where each element of the claim is found in the prior art patents or printed publications relied upon.”).

Under 35 U.S.C. § 102, “a claim is anticipated ‘if each and every limitation is found either expressly or inherently in a single prior art reference.’” *King Pharms., Inc. v. Eon Lab’ys, Inc.*, 616 F.3d 1267, 1274 (Fed. Cir. 2010) (quoting *Celeritas Techs. Ltd. v. Rockwell Int’l Corp.*, 150 F.3d 1354, 1360 (Fed. Cir. 1998)). “Anticipation requires the presence in a single prior art disclosure of all elements of a claimed invention arranged as in the claim.” *Therasense, Inc. v. Becton, Dickinson & Co.*, 593 F.3d 1325, 1332 (Fed. Cir. 2010) (quoting *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983)). A reference inherently discloses an element of a claim “if that missing characteristic is necessarily present, or inherent, in the single anticipating reference.” *Schering Corp. v. Geneva Pharms.*, 339 F.3d 1373, 1377 (Fed. Cir. 2003) (citing *Cont’l Can Co. USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991)). “Inherency, however,

may not be established by probabilities or possibilities. The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient.” *Therasense*, 593 F.3d at 1332 (quoting *Cont’l Can*, 948 F.2d at 1269).

A patent claim is unpatentable under 35 U.S.C. § 103 if “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” The question of obviousness is resolved based on underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when presented, objective evidence of obviousness or nonobviousness, i.e., secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

A patent claim “is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). An obviousness determination based on a combination of references requires finding “both ‘that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.’” *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367–68 (Fed. Cir. 2016) (citation omitted); *see KSR*, 550 U.S. at 418. Further, an assertion of obviousness “cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR*, 550 U.S. at 418; *In re NuVasive, Inc.*, 842 F.3d 1376, 1383 (Fed. Cir. 2016) (a finding of a

motivation to combine “must be supported by a ‘reasoned explanation’” (citation omitted)).

B. Level of Ordinary Skill in the Art

Factors pertinent to determining the level of ordinary skill in the art include (1) the educational level of the inventor; (2) the type of problems encountered in the art; (3) prior-art solutions to those problems; (4) the rapidity with which innovations are made; (5) the sophistication of the technology; and (6) the educational level of workers active in the field. *Envtl. Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696–97 (Fed. Cir. 1983). Not all factors may exist in every case, and one or more of these or other factors may predominate in a particular case. *Id.* These factors are not exhaustive, but merely a guide to determining the level of ordinary skill in the art. *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007). Moreover, the prior art itself may reflect an appropriate skill level. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

Petitioner asserts that an ordinarily skilled artisan at the time of the alleged invention would 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 (systems on chip) 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. Pet. 13–14. Petitioner further asserts that an ordinarily skilled artisan would have had an understanding of SoC interconnects, as well as the concepts of large-scale networks. *Id.* at 14.

In the Qualcomm litigation, Patent Owner described a person of ordinary skill in the art as having

a Bachelor of Science (or equivalent) degree in electrical engineering, computer engineering, or a related field, and 2–3 years of work experience in very large-scale integrated (“VLSI”) systems, such as application-specific integrated circuits (“ASICs”), application-specific standard parts (“ASSPs”), system-on-chip (“SoC”), or field programmable gate arrays (“FPGAs”), and has an understanding of on-chip interconnection networks.

Ex. 1017, 11 (Qualcomm Litigation, Doc. # 81, Network System Technologies, LLC’s Response to Defendants’ Joint Opening Claim Construction Brief, Nov. 16, 2023, at 5). In the present proceeding, however, Patent Owner represents that, “[f]or purposes of this proceeding only, Patent Owner applies Petitioner’s proposed level of skill.” PO Resp. 14.

We find that Petitioner’s proposal is consistent with the level of skill reflected in the specification of the ’052 patent (“Specification”) and in the asserted prior-art references. *See Okajima*, 261 F.3d at 1355. Thus, for purposes of this Decision, we adopt Petitioner’s definition. We note, however, that we would reach the same conclusions in this Decision if we were to adopt the definition that Patent Owner set forth in the Qualcomm litigation.

C. Claim Construction

The Petition identified two terms as potentially requiring construction: “interconnect means,” recited in claims 1, 6, and 7; and “mapping means,” recited in claims 1 and 7. Pet. 10–13. Patent Owner applies Petitioner’s proposed construction of “mapping means” for purposes of this proceeding but identifies two disputes with respect to “interconnect means.” PO Resp. 15–24. Patent Owner also contends that “[t]he Board correctly found in the Institution Decision that the preamble of claim 6 is limiting” and notes that, “[t]o 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.’” *Id.* at 24–25 (citing Dec. 25–26; Ex. 1001, 10:7–32; Ex. 1016, 13; Ex. 2022, 59; Ex. 2040, 12–13 (Qualcomm litigation, Doc. # 77, Defs.’ Joint Opening Claim Construction Br., Oct. 12, 2023, at 5–6); Ex. 2068, 67:16–68:11; Ex. 2070 ¶¶ 132–135, 138).

1. General Principles

In an *inter partes* review, we apply the same claim construction standard as would be used by a district court to construe a claim in a civil action involving the validity or infringement of a patent. 37 C.F.R. § 42.100(b). Under that standard, claim terms are given their ordinary and customary meaning, as would have been understood by a person of ordinary skill in the art at the time of the invention, in light of the language of the claims, the specification, and the prosecution history of record. *Id.*; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–19 (Fed. Cir. 2005) (en banc); *Thorner v. Sony Comput. Entm’t Am. LLC*, 669 F.3d 1362, 1365–66 (Fed. Cir. 2012). “The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (quoting *Vivid Techs., Inc. v. Am. Sci. Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

2. Means-Plus-Function Claiming

The patent statute provides that “[a]n element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.”

35 U.S.C. § 112 ¶ 6 (2006). “[T]he use of the word ‘means’ in a claim element creates a rebuttable presumption that § 112, para. 6 applies.” *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015) (en banc in relevant part); *Personalized Media Commc’ns, LLC v. Int’l Trade Comm’n*, 161 F.3d 696, 703–04 (Fed. Cir. 1998). “[This] presumption may be rebutted if the properly construed claim limitation itself recites sufficiently definite structure to perform the claimed function.” *Kemco Sales, Inc. v. Control Papers Co.*, 208 F.3d 1352, 1361 (Fed. Cir. 2000).

Construing a means-plus-function limitation involves two steps: first, we identify the claimed function or functions; and second, we determine what structure, if any, disclosed in the patent’s specification corresponds to the claimed function or functions. *Williamson*, 792 F.3d at 1351; *see Medtronic, Inc. v. Advanced Cardiovascular Sys., Inc.*, 248 F.3d 1303, 1311 (Fed. Cir. 2001). For the second step, a person of ordinary skill in the art must “recognize the structure in the specification and associate it with the corresponding function in the claim.” *All-Voice Computing PLC v. Nuance Commc’ns, Inc.*, 504 F.3d 1236, 1241 (Fed. Cir. 2007). The “duty to link or associate structure to function is the *quid pro quo* for the convenience” of using means-plus-function claiming. *B. Braun Med., Inc. v. Abbott Lab’ys*, 124 F.3d 1419, 1424 (Fed. Cir. 1997).

When a limitation recites two or more functions, the specification “must disclose adequate corresponding structure to perform *all* of the claimed functions.” *Media Rights Techs., Inc. v. Capital One Fin. Corp.*, 800 F.3d 1366, 1374 (Fed. Cir. 2015) (emphasis by the court); *see Noah Sys., Inc. v. Intuit Inc.*, 675 F.3d 1302, 1318–19 (Fed. Cir. 2012) (considering means-plus-function limitation specifying two functions).

3. *“Interconnect Means”*

a. *The Parties’ Contentions*

In the Petition, Petitioner argues that the term “interconnect means” should be construed as a means-plus-function term in accordance with 35 U.S.C. § 112 ¶ 6. Pet. 10. According to Petitioner, the function for the interconnect means in claim 6 is “coupling said plurality of processing modules (M, S),” while the functions for the interconnect means in claims 1 and 7 are “coupling said plurality of processing modules (M, S)” and “enabling a connection-based communication having a set of connection properties.” *Id.* Petitioner further contends that the Specification identifies a bus, switch, point-to-point wire, and network as the structure corresponding to those functions. *Id.* (citing Ex. 1001, 1:50–52, 2:32–42, 4:43–50).

Patent Owner responds that there are two disputes with regard to the term “interconnect means”: first, “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 [a] prior construction in the Eastern District of Texas”; and second, a dispute relating to the corresponding structure if “interconnect means” is a means-plus-function term. PO Resp. 15 (citing Ex. 2022, 58 (TI litigation, Doc. # 150, Claim Construction Order, Jan. 3, 2024)). Regarding the first dispute, Patent Owner contends that, notwithstanding the inclusion of the word “means” in its name, “interconnect means” “has a sufficiently definite meaning as the name for structure”—specifically, “a network that can include routers and/or switches”—such that

it should not be construed under pre-AIA 35 U.S.C. § 112 ¶ 6.⁸ *Id.* at 15–17. According to Patent Owner, “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.” *Id.* at 18 (citing Ex. 2022, 20–24, 51; *Facebook, Inc. v. Sound View Innovations, LLC*, IPR2017-00998, Paper 13 at 16 (PTAB Sept. 5, 2017)). Regardless, Patent Owner contends, “the outcome would be [the] same if the Board adopts either Patent Owner’s construction or the corresponding structure under Patent Owner’s proposal,” and accordingly, “the Board need not decide whether ‘interconnect means’ is subject to § 112, ¶ 6,” and “[i]nstead . . . need only decide, as it did in the Institution Decision, that the corresponding structure identified by Petitioner is incorrect.” *Id.* at 16 (citing Dec. 18).

Regarding the corresponding structure, Patent Owner argues that, “[i]f 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.” PO Resp. 21. Patent Owner explains that, while “[g]enerally speaking, there are many different ‘networks,’” “in the context of the [’]052 Patent, a ‘network’ is a ‘multi-hop interconnection between modules separated by one or more network nodes.” *Id.* at 18. According to Patent Owner, “[t]he meaning of ‘network’ in this context has been litigated in related district court proceedings,” including in the TI litigation, and Petitioner itself “stipulated in related litigation that ‘network’ in closely

⁸ Section 4 of the AIA amended 35 U.S.C. § 112, effective September 16, 2012. Because the ’052 patent issued from an application filed before that date, we refer to the pre-AIA version of § 112.

related patents” has the meaning advanced by Patent Owner, and Petitioner “agreed that terms should have a common meaning across these patents.” *Id.* at 18–19 & n.2 (citing Ex. 1016, 13 (Qualcomm litigation, Doc. # 77 at 6)). Furthermore, Patent Owner contends, this construction is consistent with the teachings of the ’052 patent, which distinguish the prior art on the basis of the use of a multi-hop network separated by one or more network nodes and point out the advantages of such a multi-hop network. *Id.* at 19 (citing Ex. 1001, 2:33–37; Ex. 2070 ¶ 112).

Responding to a statement in the Institution Decision that, “[t]o the extent that Patent Owner’s proposed construction remains relevant at trial or is included in the proposed structure of a means-plus-function construction of interconnect means, further discussion and evidence of what a ‘hop’ entails . . . would be helpful” (Dec. 43), Patent Owner further explains that “[i]n a multi-hop interconnect, packets are transmitted from an initiator to a target through one or more intermediate routers or switches or ‘hops,’” where “[a] ‘hop’ is a router or switch that a packet originating from an arbitrary protocol may traverse.” PO Resp. 19–20 (citing Ex. 2005, 4; Ex. 2020 ¶¶ 114–115; Ex. 2073, 80; Ex. 2075, 2). Patent Owner contends, “each router or switch is indirectly connected to the remaining routers or switches through the ‘network,’” and “[t]he 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.” *Id.* at 20–21 (citing Ex. 2070 ¶¶ 116–119, 122; Ex. 2073, 13). “As taught in the [’]052 Patent,” Patent Owner argues, “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” and “did not send packets.” *Id.* at 21

(citing Ex. 2070 ¶¶ 120–122; Ex. 2073, 15; Ex. 2076, 2). According to Patent Owner, “[t]he [’]052 Patent describes this ‘packetization’ as the key to effectuating NoC communication.” *Id.* (citing Ex. 1001, 6:30–38; Ex. 2070 ¶ 120). Thus, Patent Owner contends, “[i]n 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,” as “[t]he 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.” *Id.* at 22 (citing Dec. 15–18; Ex. 1001, 1:48–54, 2:31–34; Ex. 2070 ¶¶ 125–127). Finally, Patent Owner contends, the Board correctly recognized in the Institution Decision that the single sentence in the Specification relied upon by Petitioner and describing the NoC as including “wires, bus, time-division multiplexing, switches, and/or routers within a network” “merely means that the network ‘could include . . . wires and buses’ but it does not ‘mean that the interconnect can be just wires or buses.’” *Id.* at 23 (citing Dec. 17; Ex. 1001, 4:46–50; Pet. 56; Ex. 2070 ¶ 127). According to Patent Owner, a person of ordinary skill in the art “would understand that the interconnect means ‘may include wires, bus, time-division multiplexing, switches, and/or routers’ that are arranged ‘within a network’” but “must be arranged such that they implement the packetized, multi-hop scheme separated by one or more network nodes.” *Id.* (citing Ex. 1001, 4:46–52; Ex. 2070 ¶ 127).

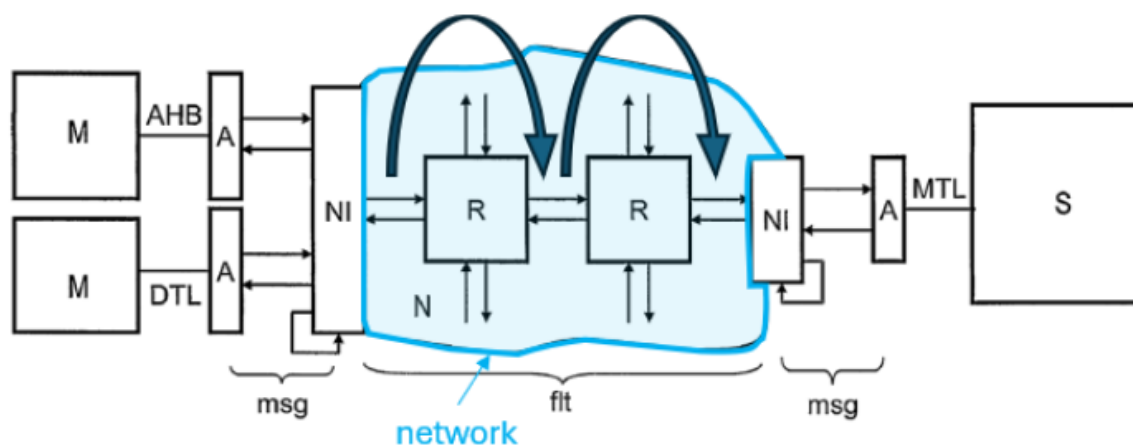
In the Reply, Petitioner contends that the Board’s preliminary determination that “interconnect means” is governed by 35 U.S.C. § 112 ¶ 6 was correct, but Petitioner nonetheless disagrees with the Board’s preliminary determination that the corresponding structure should be limited to a “network.” Reply 1. According to Petitioner, “[t]he term the

specification distinguishes from a ‘mere’ bus, switch, or point-to-point wire is ‘network,’ not ‘interconnect,’” and “patentee chose to use the broader claim term ‘interconnect means,’ rather than ‘network’ or ‘network means.’” *Id.* (citing Ex. 1001, 1:48–54, 2:31–42; Ex. 1030 ¶¶ 9–15). Nonetheless, Petitioner argues, “[i]t is unnecessary . . . for the Board to expressly determine whether the corresponding structure is limited to a ‘network,’” because “[f]or Grounds 1 and 2, [Patent Owner] does not dispute that Radulescu2004 discloses a network,” and “[f]or Grounds 3 and 4, . . . Weber discloses a ‘network’ even under [Patent Owner’s] construction.” *Id.* at 1–2.

In its Sur-reply, Patent Owner responds that Petitioner does not rebut Dr. Bagherzadeh’s testimony that a person of ordinary skill in the art would have understood “interconnect means” to be the name for a structure, such that the term should not be construed under 35 U.S.C. § 112 ¶ 6, but that, “[r]egardless, the Board need not decide whether ‘interconnect means’ is a means-plus-function term because the result is the same under either of Patent Owner’s proposals.” Sur-reply 1 (citing PO Resp. 16–18; Reply 1; Ex. 2084, 190:16–192:8). Consistent with its proposals in its Response, Patent Owner contends that “interconnect means” does not encompass buses, switches, or point-to-point wires by themselves but instead is “embodied as a network on chip.” *Id.* at 2 (citing Ex. 1001, 4:46–48; Ex. 1050, 10:17–24, 20:20–21:6; Ex. 2070 ¶ 109). According to Patent Owner, “[t]he fact that this network ‘may *include*’ a bus, switch or point-to-point wire ‘*within* a network’ does not mean that a bus, switch or point-to-point wire is by itself a network.” *Id.* (citing Ex. 1001, 4:48–50; Ex. 2070 ¶¶ 126–128). Pointing out that “the specification [of the ’052 patent] distinguishes the NoC from direct interconnects such as buses and direct point-to-point wires,” Patent Owner contends that “[t]he Reply does not address Patent Owner’s authority holding

that it is improper to construe a term to read on prior art that the specification distinguishes from the invention.” *Id.* (citing Ex. 1001, 1:48–54, 2:31–42, 6:8–12; Ex. 2084, 192:12–194:3, 194:12–195:10; PO Resp. 18–19). Patent Owner further contends that the Reply does not (1) address any of the intrinsic evidence supporting Patent Owner’s construction of the “interconnect means” as “a multi-hop interconnection between modules separated by one or more network nodes” or (2) deny that Petitioner agreed to this construction for “network” in district court. *Id.* (citing PO Resp. 15–23; Reply 1–2; Ex. 1001, 2:33–37; Ex. 1016, 13; Ex. 2022, 20–24, 51; Ex. 2070 ¶¶ 103–110).

Patent Owner further contends, “[a]s the Institution Decision recognized, the dispute boils down to what a ‘hop’ entails.” Sur-reply 2 (citing Dec. 43). According to Patent Owner, “[a] ‘hop’ occurs when a packet traverses a network node.” *Id.* at 3 (citing PO Resp. 19–20). To illustrate, Patent Owner provides the following annotated version of Figure 1 of the ’052 patent:



EX1001, FIG. 1 (excerpted and annotated)

Id. In the annotated Figure 1 reproduced above, Patent Owner has added blue shading to network N, labeled it as “network,” and added two curved

arrows depicting the traversal of a packet through routers R between network interface NI associated with master modules M and network interface NI associated with slave module S.⁹ With reference to the annotated Figure 1, Patent Owner asserts that “network N is a **multi**-hop interconnection at least because a packet traverses multiple network nodes between modules M and S. *Id.* Patent Owner contends that this understanding is consistent with Dr. Hassoun’s deposition testimony that a packet “going directly from one node to another node . . . [i]s not a hop” and that there is a “distinction” between this and a “packet travel[ing] from a first network node to [a] router and then from the router to a second network node,” in which case “the router would be a hop.” *Id.* at 4 (quoting Ex. 2068, 27:8–28:1). Patent Owner acknowledges a later statement in Dr. Hassoun’s Reply Declaration that “a ‘hop’ is merely ‘a communication **link** with a node on each end,’” but contends that statement is both “inconsistent with his prior testimony and, in any event, incorrect because data does not ‘hop’ anything in a direct link between two nodes.” *Id.* at 5 (quoting Ex. 1030 ¶ 18 (emphasis added)) (citing Ex. 2070 ¶¶ 114–117; Ex. 2084, 206:19–208:5).

Finally, Patent Owner contends that a “hop” uses packet-based communication. Sur-reply 6. According to Patent Owner, “[p]erhaps *the* hallmark feature of an NoC compared to traditional interconnects is that is [sic] uses packet-based communication.” *Id.* (citing PO Resp. 21; Ex. 1001, 6:30–38; Ex. 1050, 14:23–15:23; Ex. 1051; Ex. 2005, 4; Ex. 2070 ¶¶ 120–122; Ex. 2073, 15; Ex. 2076, 2). “In other words,” Patent Owner

⁹ Patent Owner has additionally labeled the annotated figure as “EX1001, FIG.1 (excerpted and annotated).” However, the annotated figure appears to include all of Figure 1 of the ’052 patent, not merely an excerpt.

argues, “the thing that traverses a network node during a ‘hop’ is a packet,” and “[i]ndeed, Dr. Hassoun admitted that in NoCs, ‘packets are transmitted over the network.’” *Id.* (citing Ex. 2068, 26:22–24, 27:17–28:1).

b. District Court Constructions

In addition to considering the parties’ claim construction arguments, we also consider the claim constructions in the related district court proceedings. *See* 37 C.F.R. § 42.100(b) (“Any prior claim construction determination concerning a term of the claim in a civil action, or a proceeding before the International Trade Commission, that is timely made of record in the inter partes review proceeding will be considered.”).

The district court in the TI litigation construed “interconnect means” as a “multi-hop interconnection between modules separated by one or more network nodes.” Ex. 2022, 51. The district court in the Samsung litigation did not issue a claim construction order as of the time that the litigation was dismissed, but the parties in that litigation stipulated that “interconnect means” is a “multi-hop interconnection between modules separated by one or more network nodes.” Ex. 2033, 12; Ex. 2035, 2 n.2.

The district court in the Qualcomm litigation issued a claim construction order on March 31, 2025, finding that the presumption that 35 U.S.C. § 112 ¶ 6 applies was rebutted and construing “interconnect means” according to Patent Owner’s proposal as a “multi-hop interconnection between modules separated by one or more network nodes.” Ex. 1071, 27–29. In reaching that conclusion, the court found that the ’052 patent uses the terms “interconnect means” and “network” interchangeably, denoting both by the letter “N,” where “[t]he ‘interchangeable use of the two terms is akin to a definition equating the two.’” *Id.* at 28 (quoting *Edwards Lifesciences v. Cook*, 582 F.3d 1322, 1329 (Fed. Cir. 2022)) (citing Ex. 1001,

5:24, 9:32). The court further noted that “the parties agreed that ‘network’ is ‘a multi-hop interconnection between modules separated by one or more network nodes” and that the TI court had adopted the same reasoning to adopt the same construction. *Id.* at 28–29 (citing Ex. 2022, 50; Ex. 2040, 13 (Qualcomm litigation, Doc. # 77 at 6)). Moreover, the court explained, “[b]ecause this phrase is sufficiently structural, as it references an interconnection between modules, separated by nodes, Section 112 ¶ 6 does not apply.” *Id.* at 29.

c. Discussion

The term “interconnect means” includes the word “means” and thus presumptively is a means-plus-function limitation governed by 35 U.S.C. § 112 ¶ 6. *Williamson*, 792 F.3d at 1348. As we explain below, notwithstanding Patent Owner’s arguments and the district court’s determination in the Qualcomm litigation, we are not persuaded that the term “interconnect means” connotes sufficiently definite structure to overcome the presumption, and we conclude that it is a means-plus-function term subject to construction under § 112 ¶ 6.

i. Recited Functions

As set forth above, Patent Owner does not dispute Petitioner’s proposed functions for the “interconnect means,” namely, “coupling said plurality of processing modules (M, S),” in the context of claim 6, and “coupling said plurality of processing modules (M, S)” and “enabling a connection-based communication having a set of connection properties,” in the context of claims 1 and 7. *See* Pet. 10; PO Resp. 15–16. We agree and adopt those undisputed functions for purposes of this Decision.

ii. *Corresponding Structure*

Although we disagree with Patent Owner’s contention, as set forth above, that “interconnect means” recites sufficiently definite structure as to overcome the presumption that it should be construed as a means-plus-function term subject to 35 U.S.C. § 112 ¶ 6, we agree with Patent Owner and the findings of the district court in the parallel Qualcomm litigation that the ’052 patent uses the term interchangeably with “network.” *See, e.g.*, Ex. 1001, 4:46–48 (“The interconnect is embodied as a network on chip NOC”), 8:47–51 (“[T]he . . . mapping is relevant for communication protocols . . . implemented with an interconnect supporting connections (e.g., Aethereal network on chip).”). Indeed, as noted by the court in the Qualcomm litigation, each recitation of “interconnect means” in the abstract and claims of the ’052 patent is followed by the parenthetical “(N),” corresponding to “network N” in the Specification, often in the same arrangement with respect to the same elements. *Id.* at code (57) (referring to “interconnect means (N)”), 9:32 (same), 9:39–40 (same), 10:20 (same), 10:25 (same), 10:45 (same), 10:53 (same); *see also* 5:13 (“network N”), 5:16 (same), 5:18 (same), 5:24 (same), 5:64 (same), 6:62 (same); *compare, e.g.*, *id.* at 9:32–33 (reciting “an interconnect means (N) for coupling said plurality of processing modules (M, S)” and “at least one network interface (NI) . . . for controlling the communication between said at least one first of said plurality of processing modules (M) and said interconnect means (N)”), *with id.* at 5:13–21 (“Each module M, S is connected to a network N via its associated network interface NI The network interfaces NI are provided to manage the communication between the respective modules M, S and the network N”).

Regarding Petitioner’s argument that the Specification identifies buses, switches, and point-to-point wires, in addition to networks, as examples of interconnect means (*see* Pet. 10; Reply 1), we also agree with Patent Owner (*see, e.g.*, PO Resp. 23; Sur-reply 2) that the ’052 patent distinguishes buses, switches, and point-to-point wires from the interconnects used for the disclosed NoCs:

Using networks for on-chip communication when designing systems on chip (SoC), however, raises a number of new issues that must be taken into account. This is because, *in contrast to existing on-chip interconnects (e.g., buses, switches, or point-to-point wires)*, where the communicating modules are directly connected, *in a NoC* the modules *communicate remotely via network nodes*.

Ex. 1001, 1:48–54 (emphases added). The Specification further teaches: “Introducing *networks as on-chip interconnects* radically changes the communication when *compared to direct interconnects, such as buses or switches*.” *Id.* at 2:31–34 (emphases added).

The portions of the Specification cited by Petitioner in support of its proposed construction do not provide contrary teachings. First, Petitioner cites to lines 50 through 52 of column 1 of the Specification, which are part of the first disclosure quoted above. Pet. 10; Reply 1. As set forth above, that disclosure teaches that buses, switches, and point wires are not part of the corresponding structure for the interconnect means in the ’052 patent’s embodiments. Ex. 1001, 4:43–48.

Second, Petitioner cites to lines 32 through 42 of column 2, which contain the second quoted disclosure above. Pet. 10; Reply 1. The portion of this disclosure that is not set forth in the quote above is:

This is because of the multi-hop nature of a network, where communication modules are not directly connected, but separated

by one or more network nodes. *This is in contrast with the prevalent existing interconnects (i.e., buses) where modules are directly connected.* The implications of this change reside in the arbitration (which must change from centralized to distributed), and in the communication properties (e.g., ordering, or flow control).

Ex. 1001, 2:34–42 (emphasis added). This additional disclosure, which is in the Specification’s Background of the Invention, further teaches that the structure for the recited interconnects does not include direct connections or buses.

Third, Petitioner cites lines 43 through 50 of column 4 of the ’052 patent. Pet. 10. The following sentences appear in that disclosure:

The interconnect is embodied as a network on chip NOC, allowing communication between all aforementioned modules. The network on chip may include wires, bus, time-division multiplexing, switches, and/or routers within a network.

Ex. 1001, 4:46–50. This passage indicates that the interconnect can be a network on a chip and the network on a chip can include wires and buses. That does not necessarily mean that the interconnect can be just wires or buses; rather, it discloses that the interconnect can include wires and buses. In context, the disclosure regarding wires and buses does not support construing the corresponding structure broadly enough to encompass just wires and buses. The networks that constitute the corresponding structure, however, could include networks with wires and buses.

Therefore, we agree with Patent Owner that the corresponding structure for the interconnect means should not include a mere bus, switch, and point-to-point wire and instead find that the corresponding structure under 35 U.S.C. § 112 ¶ 6 is a network, which the ’052 patent describes as a multi-hop interconnection between modules separated by one or more

network nodes. *See* Ex. 1001, 2:33–37. Because this structure corresponds to the construction of “interconnect means” proposed by Patent Owner and adopted by the district courts in the TI and Qualcomm litigations (*see supra* Section III.C.3.b), and we do not rely in our analysis below on a recourse to “equivalents thereto” as permitted by § 112 ¶ 6, we note that our ultimate conclusions on the unpatentability of the challenged claims would be the same if § 112 ¶ 6 did not apply.

iii. Conclusion

For the reasons stated above, we construe “interconnect means” to cover the structure described in the Specification corresponding to the specified functions of “coupling said plurality of processing modules (M, S)” in the context of claim 6 and “coupling said plurality of processing modules (M, S)” and “enabling a connection-based communication having a set of connection properties” in the context of claims 1 and 7—i.e., a “multi-hop interconnection between modules separated by one or more network nodes”—and equivalents thereof.

4. “Mapping Means”

Petitioner contends that “mapping means,” recited in claims 1 and 7 as “mapping means (A),” is presumptively a means-plus-function term subject to construction under 35 U.S.C. § 112 ¶ 6. Pet. 11. Petitioner identifies as the corresponding function “mapping the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties according to said at least one communication service identification.” *Id.* Petitioner identifies as the corresponding structure “an adapter unit,” as illustrated in Figures 2A, 2B, and 3 and described in the Specification. *Id.* at 11–13 (citing Ex. 1001,

5:10–13, 5:58–6:3, 6:33–37, 6:39–53, 6:56–7:14, 7:34–39, Figs. 2A, 2B, 3; Ex. 1003 ¶ 85).

As noted above, Patent Owner “applies Petitioner’s construction for purposes of this proceeding.” PO Resp. 23–24. We likewise apply Petitioner’s construction for purposes of this Decision.

5. *Additional Claim Terms*

After reviewing the parties’ arguments and evidence, we determine that express claim construction is unnecessary for any other claim terms. *See Realtime Data*, 912 F.3d at 1375.

D. Ground 1: Asserted Anticipation by Rădulescu2004

Petitioner asserts that Rădulescu2004 anticipates claims 1, 2, and 5–7. Pet. 3. We begin with a brief overview of Rădulescu2004, followed by a discussion of whether Rădulescu2004 qualifies as a prior-art printed publication under pre-AIA 35 U.S.C. § 102, and then discuss Petitioner’s assertion that claims 1–7 are unpatentable over Rădulescu2004.

1. Overview of Rădulescu2004

Rădulescu2004 describes a network interface (NI) for an on-chip network. Ex. 1005, 1, Abstract. Rădulescu2004 describes that it split the design of its network interface in two parts as shown in Figure 1 below:

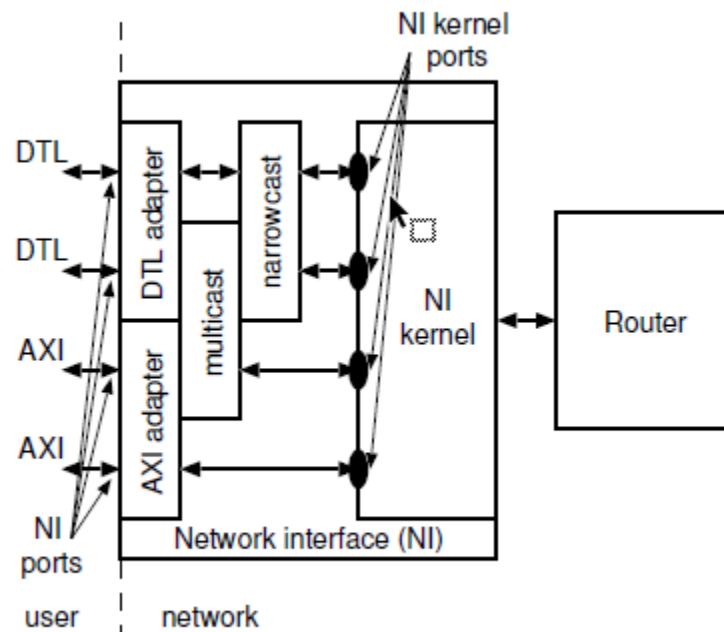


Figure 1. NI kernel and shells

Ex. 1005, 3. Figure 1 above shows (a) an NI kernel, which implements the channels, packetizes messages and schedules them to the routers, implements the end-to-end flow control, and the clock domain crossing, and (b) the NI shells, which implement the connections (e.g., narrowcast, multicast), transaction ordering for connections, and other higher-level issues specific to the protocol offered to the IP. Ex. 1005, 3. The NI kernel communicates with the NI shells via ports. *Id.* at 4. Although the NI kernel can implement point-to-point connections, the NI shells implement more complex transactions, such as narrowcast or multicast connections. *Id.*

Rădulescu2004 explains that messages can be mapped to connections by use of “connid” signals. Specifically, when a port has “multiple connections to allow differentiated traffic classes,” connid signals are used to “select on which connection a message is supplied or consumed.” Ex. 1005, 3. Figure 3 of Rădulescu2004 is shown below:

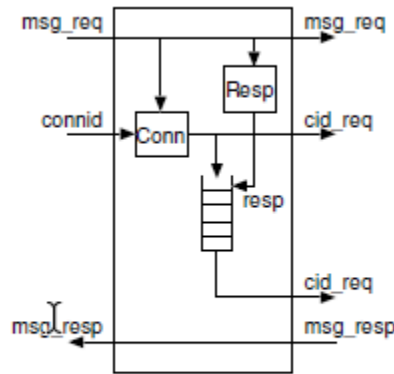


Figure 3. Narrowcast shell

Ex. 1005, 4. Figure 3 above shows an example of a narrowcast shell. *Id.*

Figure 8 of Rădulescu2004 is shown below:

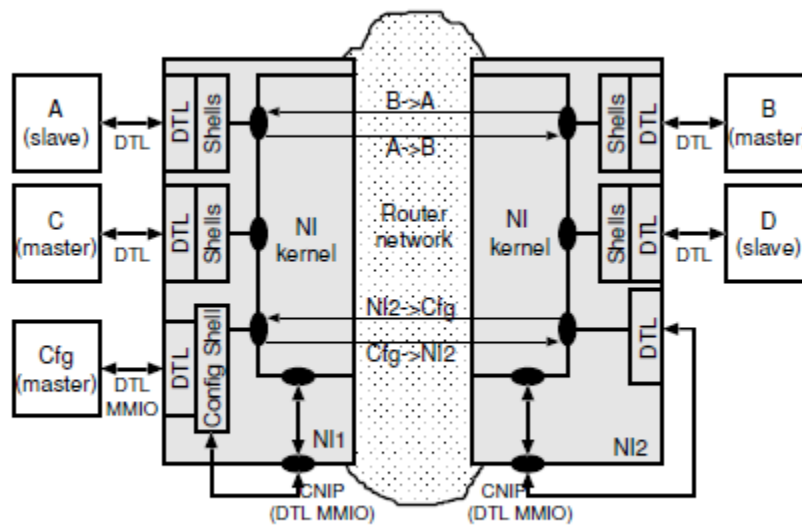


Figure 8. NI configuration

Ex. 1005, 5. Figure 8 above shows a network interface configuration. *Id.*

Rădulescu2004 explains that with this embodiment:

Configuration is performed using the NoC itself (i.e., there is no separate control interconnect needed for NoC configuration). Consequently, the CNIPs [configuration ports for network interfaces] are connected to the NoC like any other slave (see CNIP at NI2 in Figure 8). At the configuration module *Cfg*'s NI, we introduce a configuration shell (*Config Shell*), which,

based on the address configures the local NI (NI1), or sends configuration messages via the NoC to other NIs. The configuration shell optimizes away the need for an extra data port at NI1 to be connected to the NI1's CNIP.

Id.

2. *Whether Rădulescu2004 Qualifies as a Prior-Art Printed Publication*

Petitioner contends that Rădulescu2004 is prior art under pre-AIA 35 U.S.C. § 102(a) and (b). Pet. 2 (citing Ex. 1012 ¶¶ 5–23 and accompanying exhibits; Ex. 1015, 3; Ex. 1018). More specifically, Petitioner argues that Rădulescu2004 is prior art under pre-AIA 35 U.S.C. § 102(b) because it was available to the public more than one year prior to the March 7, 2005, effective U.S. filing date of the '052 patent. *Id.* In support, Petitioner submitted the following evidence with the Petition: (1) a Declaration of Nikil Dutt, Ph.D. and accompanying exhibits (Exhibit 1012, “Opening Dutt Declaration”); (2) a Declaration of Gordon MacPherson (Exhibit 1018, “MacPherson Declaration”); and (3) Network System Technologies, LLC's Responses to Qualcomm's First Set of Requests for Admission (Nos. 1–9) from the Qualcomm litigation (Ex. 1015, “RFA Responses”). Pet. 2.

Dr. Dutt testifies in his opening Declaration that he “hold[s] the position of Distinguished Professor at the University of California, Irvine” and “ha[s] worked for 34 years in the fields of Electrical Engineering and Computer Science.” Ex. 1012 ¶¶ 2, 5. He further testifies, “During the course of my 34-year long career, I have attended and presented at numerous technical conferences focused on computer chip design,” including “the annual Design, Automation and Test in Europe (DATE) Conference,” which “was (and still is) known as an important conference in the computer chip

design field.” *Id.* ¶¶ 5–6. Dr. Dutt testifies that he has attended nearly every DATE conference since 1998 and that, “[f]or as long as I can recall, including in the early and mid-2000s, it has been the practice of the DATE conference organizers to provide a set of all the papers accepted for that year’s DATE conference to attendees at the conference check-in table,” which “set of papers was known as the ‘proceedings’ for that year’s conference.” *Id.* ¶¶ 7, 9.

Dr. Dutt further testifies, *inter alia*, that:

- he “personally registered for and attended the DATE 04 Conference,” “held February 16-20, 2004 in Paris, France”;
- copies of “all the papers accepted for the DATE 04 conference” and “the proceedings for DATE 04” were “given to conference participants upon registration at the start of the conference, as part of the conference materials”;
- upon check-in at the DATE 04 conference, he “was given a physical copy of the DATE 04 proceedings (either in paper or CD form),” “includ[ing] all the papers accepted for that year’s conference”;
- he “recall[s] that there were on the order of 500 in-person attendees at the DATE 04 conference”;
- “[t]here were no confidentiality restrictions at this conference,” and although “[o]ne had to register to attend the DATE 04 conference, . . . registration was open to any interested member of the public”;
- Rădulescu2004 is included, along with six papers that Dr. Dutt authored or co-authored that were accepted for the DATE 04 conference, in the online archive of the proceedings of the DATE 04 conference accessible at <https://past.date-conference.com/proceedings-archive/2004/YEAR.HTM>, a copy of which is provided as Exhibit 1 to the Opening Dutt Declaration; and

- Kees Goossens, co-inventor of the '052 patent and also one of the co-authors of Rădulescu2004, also has Rădulescu2004 “listed and linked on his research website as having been presented at the DATE 04 conference, in February 2004,” “consistent with the academic practice in my field at the time (and today).”

Id. ¶¶ 11–17, 20–23 (citing accompanying exhibits).

Mr. MacPherson testifies that he serves as “Director, Board Governance & Policy Development of The Institute of Electrical and Electronics Engineers, Incorporated (‘IEEE’)” and acts as “a custodian of certain records for IEEE.” Ex. 1018 ¶¶ 1, 4. Mr. MacPherson explains that his testimony rests on his “personal knowledge and information contained in the business records of IEEE.” *Id.* ¶ 5. Mr. MacPherson also explains that “[i]t is the regular practice of IEEE to publish articles and other writings including article abstracts and make them available to the public,” e.g., “through the IEEE digital library, IEEE Xplore.” *Id.* ¶¶ 6–7.

Mr. MacPherson also testifies that Rădulescu2004 was (1) published in the conference proceedings titled “Proceedings Design, Automation and Test in Europe Conference and Exhibition,” for a conference that took place from February 16–20, 2004, and (2) “made available no later than the last day of the conference.” Ex. 1018 ¶¶ 8, 11. Mr. MacPherson testifies that he obtained a copy of Rădulescu2004 through IEEE Xplore, where it is maintained in the ordinary course of IEEE’s business, showing its date of publication based on metadata associated with the publication. *Id.* ¶¶ 9–10. The IEEE Xplore bibliographic data for Rădulescu2004, which is included as Exhibit A to the MacPherson Declaration, includes the following information: “Date of Conference: 16–20 February 2004” and “Date Added to IEEE Xplore: 08 March 2004.” *Id.* at 4.

The RFA Responses include an admission by Patent Owner that Rădulescu2004 “was publicly available as of the end of February 2004” but also deny that Rădulescu2004 was available *before* the end of February 2004. Ex. 1015, 3.

Patent Owner contends that Petitioner has failed to meet its burden to establish that Rădulescu2004 qualifies as prior art. PO Resp. 26–36. Patent Owner raises several arguments in support of this contention.

First, Patent Owner contends, “the authors were working on multiple versions of papers with the same title as Rădulescu2004,” and “[a]nother paper with the same title and nearly identical content as Rădulescu2004 bearing a ‘January 2005’ date was considered during prosecution of the [’]052 Patent” and “‘revised June 9, 2004,’ . . . *after* the [’]052 Patent’s earliest priority date.” PO Resp. 26 (citing Ex. 1001, 1; Ex. 2078, 1).

Second, Patent Owner contends, Petitioner improperly incorporates by reference evidence of the availability of Rădulescu2004 to the public in the Petition. PO Resp. 26–27. More particularly, Patent Owner alleges that the Petition’s “blanket citations” to the Opening Dutt Declaration, MacPherson Declaration, and RFA Responses “‘to support conclusory statements for which the Petition does not otherwise provide an argument or explanation’ is improper.” *Id.* at 27 (quoting *Cisco Sys., Inc. v. C-Cation Techs., LLC*, IPR2014-00454, Paper 12 at 9 (PTAB Aug. 29, 2014) (informative)).

Third, Patent Owner contends, “[w]hile Rădulescu2004 bears a copyright date of ‘2004,’ that fails to prove that it was available prior to March 7, 2004,” and “Petitioner failed to show that Rădulescu2004 was publicly accessible at the [2004] DATE Conference.” PO Resp. 27. In this regard, Patent Owner argues that “cross-examination revealed that Dr. Dutt has extensive ties to Petitioner,” and “[a]ccordingly, the Board should give

Dr. Dutt’s testimony less weight than that of a disinterested witness.” *Id.* at 28 & n.4 (citing Ex. 2067, 76:11–80:8, 86:8–88:23, 95:20–97:9, 98:17–99:9; Ex. 2061, 32; Ex. 2063, 1–2). Patent Owner further contends that “Dr. Dutt has *zero* personal knowledge as to whether Rădulescu2004 was accessible at the DATE Conference 20+ years ago” and “his declaration is based entirely on an ‘archive’ website that purportedly associates Rădulescu2004 with the DATE conference,” and “the lack of corroborative evidence warrants a finding that Petitioner has not carried its burden.” *Id.* at 28–33. Regarding the MacPherson Declaration, Patent Owner contends that Mr. MacPherson (1) has no personal knowledge of the DATE conference, (2) did not work at the IEEE in the relevant timeframe, and (3) “cannot attest to whether” the IEEE Xplore bibliographic data is “accurate.” *Id.* at 33 (citing Ex. 2069, 9:5–11, 14:2–16:20, 20:25–22:19, 25:15–26:10). Patent Owner contends that “[i]nformation in IEEE Xplore can be miscatalogued and inaccurate.” *Id.* Further, Patent Owner asserts that the IEEE’s “terms of service contain an express disclaimer stating that user should not rely on such information being appropriately catalogued for purposes of ‘invalidity of . . . any patent.’” *Id.* at 33–34 (alteration by Patent Owner) (quoting Ex. 2065, 3). Regarding the RFA Responses, Patent Owner argues Petitioner’s reliance thereon “is improper because they do not constitute ‘an admission for any other purpose and cannot be used against the party in any other proceeding.’” *Id.* at 34 (quoting Fed. R. Civ. P. 36(b)).

Finally, with regard to Petitioner’s contention that Rădulescu2004 qualifies as prior art under 35 U.S.C. § 102(a), Patent Owner contends that the DATE conference’s proceedings were not publicly available until two years after the conference, i.e., after the critical date; there is no evidence that the cited “archive” and Goossens websites included with the Opening Dutt

Declaration were available before the '052 patent's § 102(a) date; and Petitioner provides "'zero evidence' that Rădulescu2004 'was sufficiently indexed, catalogued, and shelved'" in IEEE Xplore "during the relevant timeframe." PO Resp. 34–35 (quoting *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 9 (PTAB Dec. 20, 2019) (precedential)) (citing Ex. 2062; Ex. 1067, 43:19–45:5).

Responding to Patent Owner's arguments, Petitioner argues that it complied with the Board's rules, and that the overwhelming evidence shows that Rădulescu2004 was accessible to a person of ordinary skill in the art exercising reasonable diligence prior to March 17, 2004. Reply 1–7. In support, Petitioner submitted, *inter alia*, the following evidence with the Reply: (1) a Reply Declaration of Nikil Dutt, Ph.D. (Exhibit 1038, "Reply Dutt Declaration"); (2) a Declaration of Sylvia Hall-Ellis, Ph.D. (Exhibit 1068); and (3) documentary evidence cited in the Dutt and Hall-Ellis reply declarations. Reply vii–viii (Exhibit List).

Dr. Dutt testifies in his reply declaration, *inter alia*, that the "IEEE's electronic publication service, IEEE Xplore, was also well-known to [skilled artisans] by early 2004" and "easily searchable" for conference proceedings, such as the conference proceedings for DATE 04. Ex. 1038 ¶¶ 11–14 (citing Ex. 1035; Ex. 1069); *see id.* ¶¶ 15–16. According to Dr. Dutt, Rădulescu2004 was added to IEEE Xplore on March 8, 2004. Ex. 1038 ¶ 13 (citing Ex. 1018, 2, 4). Dr. Dutt explains that "one could pull up the conference by title, and then peruse conference proceedings." *Id.* ¶ 14.

Dr. Hall-Ellis testifies that she serves as "an Adjunct Professor in the School of Information at San José State University" and "obtained a Master of Library Science from the University of North Texas in 1972 and a Ph.D. in

Library Science from the University of Pittsburgh in 1985.” Ex. 1014 ¶ 6
(Opening Hall-Ellis Declaration, incorporated by reference at Ex. 1068 ¶ 1).

Dr. Hall-Ellis explains that IEEE Xplore is:

- (1) familiar to librarians as a “commonly used source of publications”;
- (2) a “scholarly research database” available for electronic searching since “at least early 2002” that now contains 6.5 million documents, including “conference proceedings, ebooks, standards, technical reports, and journal articles, and related documents dating from 1988 to the present”;
- (3) used by “undergraduate and graduate students, researchers, scientists, and the public”;
- (4) “known for its reputable curation and maintenance of documents and publication information”; and
- (5) considered “a reliable source that accurately reports dates of publications and events and accurately reports locations of events in accordance with standard practices for major industry journals.”

Ex. 1068 ¶¶ 12–13, 15–16; *see id.* ¶ 10.

Dr. Hall-Ellis testifies that IEEE Xplore had “conference proceedings indexed (at least by conference title) and available by 2002.” Ex. 1068 ¶ 17. Dr. Hall-Ellis also testifies that IEEE Xplore provided an “accessible source of conference papers” for an ordinarily skilled artisan “exercising reasonable diligence prior to October 2002.” *Id.* ¶ 18.

Further, Dr. Hall-Ellis testifies that various records corroborate Dr. Dutt’s and Mr. MacPherson’s testimony that the Design, Automation and Test in Europe Conference and Exhibition 2004 took place February 16–20, 2004. Ex. 1068 ¶¶ 19–25 (citing Ex. 1018; Ex. 1066; Ex. 1067; Ex. 1070). As an example, Dr. Hall-Ellis explains that the U.S. Copyright Office registration for the book titled “Design, Automation & Test in Europe

Conference & Exhibition” shows that registration occurred on January 4, 2005, and specifies “a publication date of February 16, 2004.” *Id.* ¶ 25.

Dr. Hall-Ellis also explains that a U.S. Copyright Office registration is “the sort of information that would ordinarily be relied upon by persons in my profession as containing accurate and reliable information, including a reliable indication of the date of publication provided to [the] U.S. Copyright Office by the publisher.” *Id.*

As another example, Dr. Hall-Ellis explains that the U.S. Library of Congress online catalog record for the conference proceedings titled “Design, Automation & Test in Europe Conference and Exhibition 2004” shows that the document “was ‘Published/Created’ by the ‘IEEE Computer Society, 2004’ in ‘Los Alamitos, Calif.’” Ex. 1068 ¶ 23 (quoting Ex. 1070, 1).

Dr. Hall-Ellis also explains that the “online catalog record from the Library of Congress and the information contained in it is the sort of information that would ordinarily be relied upon by persons in my profession as being accurate and reliable.” *Id.*

Petitioner asserts that (1) the “IEEE is an established publisher” and (2) “there is a presumption of public accessibility as of the publication date” that Patent Owner has not rebutted. Reply 3 (quoting *VidStream LLC v. Twitter, Inc.*, 981 F.3d 1060, 1065 (Fed. Cir. 2020)).

Having considered the parties’ respective arguments and the evidence presented by Petitioner, we find that a preponderance of the evidence establishes that Rădulescu2004 is a printed publication that was publicly accessible more than a year before the ’052 patent’s March 7, 2005, priority date. *See, e.g.*, Ex. 1012 ¶¶ 9–23; Ex. 1018 ¶¶ 1, 5–12; Ex. 1031; Ex. 1033; Ex. 1036; Ex. 1038 ¶¶ 6–16; Ex. 1040; Ex. 1059; Exs. 1062–1067; Ex. 1068 ¶¶ 11–25; Ex. 1070.

Patent Owner's arguments do not persuade us of any fatal deficiencies in Petitioner's showing. In the Sur-reply, for example, Patent Owner contends that "[t]he Reply does not dispute that Rădulescu2004's authors worked on multiple papers with the same title with different revision dates." Sur-reply 29 (citing PO Resp. 26; Ex. 2078). Unlike Exhibit 1005, however, Exhibit 2078 does not refer to the DATE conference, and Patent Owner does not explain how the existence of that later-revised document bears on the accessibility of Exhibit 1005. Patent Owner further contends that "the Petition's reliance on the DATE04 Conference was flawed, among other reasons, because it presented no evidence POSITAs [persons of ordinary skill in the art] attended." Sur-reply 29 (citing PO Resp. 31–32). In this regard, however, we credit Dr. Dutt's un rebutted testimony that, for example, the DATE conference "was . . . known as an important conference in the computer chip design field" and that "there were on the order of 500 in-person attendees at the DATE 04 conference." Ex. 1012 ¶¶ 6, 16. Similarly, whereas Patent Owner argues that "[t]he Board should disregard Dr. Dutt's new testimony regarding POSITAs as improper new theories" (Sur-reply 29), we find that the Reply and the Reply Dutt Declaration are properly responsive to the Patent Owner Response. Still further, whereas Patent Owner argues that "Dr. Dutt testified attendees 'were not allowed to distribute the papers . . . without permission'" (Sur-reply 29 (citing Ex. 2067, 39:25–40:7)), it is clear from the cited testimony that Dr. Dutt was referring merely to the papers being subject to copyright, not to any confidentiality restrictions that would bear on their accessibility once catalogued. To the contrary, we credit Dr. Dutt's testimony, for example, that "[t]here were not any confidentiality restrictions on the information contained in papers

accepted for the DATE conferences” and that “registration was open to any interested member of the public.” Ex. 1012 ¶¶ 10, 18.

Lastly, contrary to Patent Owner’s contentions (PO Resp. 25–27; Sur-reply 27–28), we do not consider the Petition’s short statement about the relevance of the Opening Dutt Declaration (Ex. 1012), RFA Responses (Ex. 1015), MacPherson Declaration (Exhibit 1018), and accompanying exhibits as rising to the level of improper incorporation by reference. The Petition cites fourteen short paragraphs of the Opening Dutt Declaration, spanning less than four pages of double-spaced text; the Petition cites a single page of the RFA Responses; and although the Petition does not provide a pinpoint citation for the MacPherson Declaration, that declaration comprises just twelve short paragraphs on two pages. Pet. 2 (citing Ex. 1012 ¶¶ 5–23; Ex. 1015, 3; Ex. 1018). Indeed, Petitioner provides a parenthetical explanation of the significance of each of those references. *Id.* Although those explanations are short, we find them to be sufficient to allow us discern the alleged significance of the cited evidence. Furthermore, although, as Patent Owner points out (PO Resp. 34), Federal Rule of Civil Procedure 36(b) prohibits the use of admissions made under that rule against a party “in any other proceeding” (and we accordingly do not give any probative weight to that evidence), the fact that Patent Owner made an admission of public accessibility to Petitioner prior to the Petition’s filing date has some bearing on the level of effort that we would deem reasonable for Petitioner to have put into proving accessibility in its Petition.

In any event, notwithstanding Patent Owner’s contention that “[t]he Institution Decision made no findings regarding Rădulescu2004’s alleged public accessibility” (PO Resp. 25 n.3), the Board deemed Petitioner’s showing of public accessibility sufficient at the institution stage at least to

establish a reasonable likelihood that Rădulescu2004 is a printed publication that was publicly accessible more than a year before the '052 patent's March 7, 2005, priority date. Subsequently, Petitioner submitted additional evidence, and the record now establishes the same by a preponderance of the evidence for the reasons set forth above. *See, e.g.*, Ex. 1031; Ex. 1033; Ex. 1036; Ex. 1038; Ex. 1040; Ex. 1059; Exs. 1062–1068; Ex. 1070.

3. *Claim 6*

For ease of discussion based on Petitioner's presentation (*see* Pet. 20–36), we begin with claim 6.

a. *Petitioner's Contentions*

i. *[6.pre.1] Method of communication service mapping in an integrated circuit, having a plurality of processing modules (M, S)*

Petitioner argues that Rădulescu2004 “present[s] a network interface for an on-chip network” (i.e., a NoC) and states that its network interface “is intended for systems on chip (SoC).” Pet. 21 (citing Ex. 1005, Abstract). Further, Petitioner asserts that an ordinarily skilled artisan would have understood that SoCs are integrated circuits, and that Rădulescu2004's “on chip network” and the components that interface therewith are implemented on the same integrated circuit. *Id.* (citing Ex. 1003 ¶¶ 91, 122). Petitioner also argues that Rădulescu2004 discloses communication service mapping, for reasons set forth in more detail with respect to limitation 6.d. *Id.* Further, Petitioner asserts that Rădulescu2004 “discloses a plurality of processing modules in the form of ‘IP modules,’ which Rădulescu2004—like the '052 patent—calls ‘masters’ and ‘slaves.’” *Id.* (citing Ex. 1003 ¶¶ 93, 122–123; Ex. 1005, 1, 2, 4, Figs. 5, 6, 8, 9). Petitioner thus contends that Rădulescu2004 discloses this portion of the preamble. *Id.*

- ii. *[6.pre.2] wherein at least one first of said processing modules (M) requests at least one communication service to at least one second processing module (S) based on specific communication properties and at least one communication service identification, wherein said at least one communication service identification comprises at least one communication thread or at least one address range, said address range for identifying one or more second processing modules (S) or a memory region within said one or more second processing modules (S)*

Petitioner argues that Rădulescu2004 discloses a “master (a *first processing module (M)*) requesting a *communication service* to a slave (a *second processing module (S)*).” Pet. 22 (citing Ex. 1003 ¶¶ 124–125). Further, Petitioner asserts that the request messages include read and write commands. *Id.* (citing Ex. 1005, 1, 6). Petitioner argues that the requested read and write operations are based on specific communication properties. *Id.* at 23 (citing Ex. 1003 ¶¶ 124, 126–127). Petitioner asserts that Rădulescu2004 describes differentiated services and differentiated traffic classes, consistent with the ’052 patent’s description of “differential services for different traffic classes” and communication properties that include “ordering” and “flow control.” *Id.* (citing Ex. 1001, 2:38–41, 4:15–18, 7:40–48, 8:47–58; Ex. 1003 ¶¶ 124, 127; Ex. 1005, Abstract, 2–4, 6). Petitioner further asserts that “a first processing module (the master) requests a communication service to a second processing module (the slave) based on a *communication service identification* as claimed.” *Id.* at 24 (citing Ex. 1003 ¶ 124). Petitioner argues that “the requests in Rădulescu2004

include an address that identifies a slave and/or a memory within the slave.”
Id. (citing Ex. 1003 ¶ 124; Ex. 1005, 1–2, 4, Fig. 5). Petitioner further argues that “each slave identified by an address has an address range associated therewith.” *Id.* (citing Ex. 1003 ¶ 124). Petitioner quotes the following disclosure from Rădulescu2004:

We implement the narrowcast connection as a collection of point-to-point connections, one for each master-slave pair. Within a narrowcast connection, ***the slave for which the transaction is destined is selected based on the address*** (Conn block). ***The address range assigned to a slave is configurable in the narrowcast module.***

Id. at 24–25 (quoting Ex. 1005, 4, emphasis by Petitioner) (citing Ex. 1003 ¶ 124). Petitioner argues, “[t]hus, 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’ that ‘identif[ies] one or more second processing modules (S) or a memory region within said one or more second processing modules (S).’” *Id.* at 25 (citing Ex. 1003 ¶¶ 124–127).

iii. *[6.a] coupling said plurality of processing modules (M, S) by an interconnect means (N)*

Petitioner maps the recited processing modules to Rădulescu2004’s “master” and “slave” IP modules and the recited interconnect means to Rădulescu2004’s router network. Pet. 25–26 (citing Ex. 1003 ¶ 128; Ex. 1005, 1, 3–5, Figs. 1, 8). Petitioner argues that Rădulescu2004’s router network couples Rădulescu2004’s “master” and “slave” IP modules, “consistent with the ’052 patent’s description of a network with ‘interconnected network routers R.’” *Id.* (citing Ex. 1001, 5:24–25, Figs. 1, 3; Ex. 1003 ¶¶ 128–129; Ex. 1005, Fig. 8). Petitioner further argues that,

“[t]o the extent [Patent Owner] advocates a construction of ‘interconnect means’ as ‘a multi-hop interconnection between modules separated by one or more network nodes,’ an [ordinarily skilled artisan] would have understood that Rădulescu2004 discloses such an interconnect means.” *Id.* at 26 (citing Ex. 1003 ¶ 130). According to Petitioner, Rădulescu2004’s routers are “network nodes,” and an ordinarily skilled artisan would have understood that the need for a packet to traverse one or more of such routers from its source to its destination includes a “multi-hop interconnection between modules separated by one or more network nodes.” *Id.* at 26–27 (citing Ex. 1003 ¶ 130; Ex. 1005, 2).

iv. *[6.b] enabling a connection based communication having a set of connection properties*

Petitioner argues that Rădulescu2004 teaches limitation 6.b by describing that its router network “provide[s] transport layer services by defining connections . . . configured for specific properties (e.g., throughput, ordering).” Pet. 27 (emphasis omitted) (quoting Ex. 1005, 1) (citing Ex. 1005, Abstract, 2, 4–6). Petitioner further contends that Rădulescu2004’s disclosure is consistent with the ’052 patent’s discussion of connections with connection properties. *Id.* at 28 (citing Ex. 1001, 4:65–5:5; Ex-1003 ¶ 133).

v. *[6.c] controlling the communication between said at least one first of said plurality of processing modules (M) and said interconnect means (N) by at least one network interface (NI) associated to said at least one first of said processing modules*

Petitioner argues that Rădulescu2004 describes that “network interfaces (NI), [] implement the interface to the IP modules.” Pet. 28

(emphasis omitted) (alteration in original) (quoting Ex. 1005, 1) (citing Ex. 1005, 3, Figs. 3–7). Further, Petitioner asserts that “Rădulescu2004 explains that this ‘network interface has a modular design, composed of kernel and shells’ where the NI kernel ‘provides the basic functionality, including arbitration between channels . . .’ and the NI shells ‘implement (a) additional functionality, such as multicast and narrowcast connections, and (b) adapters to existing protocols, such as AXI or DTL.’” *Id.* at 29–30 (alteration in original) (quoting Ex. 1005, 6) (citing Ex. 1005, 3, 5, Figs. 8, 9). According to Petitioner, an ordinarily skilled artisan would have understood from these disclosures that the network interface (NI) controls the communication between the IP modules (including a first master module) and the interconnect means (e.g., the router network). *Id.* at 30 (citing Ex. 1003 ¶ 136).

- vi. *[6.d] 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.*

Referring back to its arguments with respect to preamble recitation 6.pre.2 and limitation 6.b, Petitioner argues that Rădulescu2004 discloses requests for communication services that are based on specific communication properties, connections with specific connection properties, and a communication service identification in the form an address range. Pet. 30 (citing Ex. 1003 ¶ 139). Further, Petitioner argues that Rădulescu2004 discloses mapping the requests to the connections according to the communication service identification. *Id.* (citing Ex. 1003 ¶ 140). Petitioner further asserts that “Rădulescu2004 describes that its NoC provides

‘narrowcast connections’ between a single master and multiple slaves and explains that such connections are implemented as ‘a collection of point-to-point connections, one for each master-slave pair.’” *Id.* (citing Ex. 1005, 4). Further, Petitioner argues that a communication service request is mapped to a particular one of these point-to-point connections in Rădulescu2004, based on the address provided in the request. *Id.* at 30–31. In support, Petitioner quotes the following disclosure from Rădulescu2004: “Within a narrowcast connection, the slave for which the transaction is destined is selected based on the address (Conn block). The address range assigned to a slave is configurable in the narrowcast module.” *Id.* at 31 (emphasis omitted) (quoting Ex. 1005, 4) (citing Ex. 1005, 4–5, Figs. 1–3, 4–9; Ex. 1003 ¶ 140). Indeed, Petitioner further argues, “[t]his is the same as what the ’052 patent (and prosecution history) describes as the claimed mapping step.” *Id.* (citing Ex. 1001, 8:7–9:5; Ex. 1002, 142; Ex. 1003 ¶¶ 141–143).

b. Patent Owner’s Contentions

Patent Owner raises two principal arguments in its Response: first, that Rădulescu2004 does not disclose a “communication service identification” that includes “at least one communication thread or at least one address range,” as recited, for example, in preamble recitation 6.pre.2; and second, that Rădulescu2004 does not disclose limitation 6.d, i.e., “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.” PO Resp. 38–44.

Regarding the “communication service identification,” Patent Owner points out that Petitioner does not allege that Rădulescu2004 discloses a “communication thread” and instead only contends that Rădulescu2004

discloses an “address range.” PO Resp. 39 (citing Pet. 22–25; Ex. 2068, 90:3–9; Ex. 2070 ¶ 146). However, Patent Owner argues, “the Board correctly found in the Institution Decision” that Petitioner’s “cited portions of Rădulescu2004 describe, at best, a request comprising an address, . . . not an address *range*.” *Id.* (citing Dec. 11, 25–26; Ex. 2070 ¶¶ 146–161). Patent Owner argues that, although Petitioner may have established that Rădulescu2004 discloses that (i) its communication service identification contains a single address for the “slave” and (ii) its “slave” has an address range assigned to it, those two disclosures do not mean that the communication service identification has an address range. *Id.* at 40–42 (citing Pet. 24–25; Ex. 1005, 1, 4, Fig. 5; Ex. 2070 ¶¶ 148–150). More particularly, Patent Owner contends, “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.” *Id.* at 42 (citing Ex. 1005, 4; Ex. 2070 ¶ 159). According to Patent Owner, “[c]ombining these concepts makes clear that the requested communication service in Rădulescu2004 is not based on an address range.” *Id.* (citing Ex. 2070 ¶ 159). Instead, Patent Owner argues, “the requested communication service is based on an address, while the address range assigned to a slave is configurable in the narrowcast shell,” and “[t]he 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,” “confirm[ing] that the request does not include an address range.” *Id.* (citing Ex. 2070 ¶ 159).

Regarding limitation 6.d, Patent Owner first points out that the recited “mapping” must be “according to said at least one communication service identification” and that the arguments discussed above with respect to the

“communication service identification” apply as well to this limitation. PO Resp. 43. Even if Rădulescu2004 did teach the recited “communication service identification,” Patent Owner contends, “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.” *Id.* According to Patent Owner, “the objective is to take a request ‘and map it to the **right connection** having connection properties.’” *Id.* (quoting Ex. 1001, 8:35–36) (citing Ex. 2070 ¶¶ 164, 166, 169); *see also id.* at 43–44 (quoting Ex. 1001, 7:44–48, 8:65–9:5). In other words, Patent Owner contends, “the claim requires mapping to a **specific** connection having **specific** connection properties as opposed to any available connection,” while “[t]he Petition fails to address how Rădulescu2004 purportedly discloses” that requirement. *Id.* at 44 (citing Pet. 30–32; Ex. 2070 ¶¶ 166, 167, 169). According to Patent Owner, “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” and “[i]nstead . . . merely selects the slave ‘based on the address provided in the transaction’ without regarding to the specific ‘connection properties’ of the connection.” *Id.* (citing Ex. 1005, 4; Ex. 2070 ¶¶ 164–167).

c. Discussion

i. Preamble Recitation 6.pre.2

After reviewing the parties’ respective arguments and cited evidence, we agree with Patent Owner that Petitioner has not shown by a preponderance of the evidence that claim 6 is anticipated by Rădulescu2004. In particular, we determine that Petitioner has not sufficiently demonstrated that Rădulescu2004 discloses a “communication service identification” that includes “at least one communication thread or at least one address range,” as

recited in preamble recitation 6.pre.2. As Patent Owner points out (*see* PO Resp. 39), Petitioner does not allege that Rădulescu2004 discloses a “communication thread,” and we accordingly focus on whether Rădulescu2004 discloses a “communication service identification” that includes an “address range.” And in that regard, we agree with Patent Owner that Rădulescu2004’s disclosures that its communication service identification contains an address for the “slave” and that the “slave” in turn can have an address range do not show that Rădulescu2004’s communication service identification itself contains an address range.

We have considered but are not persuaded by Petitioner’s argument in its Reply that Patent Owner misinterprets claim 6 as requiring communication service requests to *contain* an address range while the claim requires only that such requests be *based on* an address range. Reply 8–11. Preamble recitation 6.pre.2 recites, in relevant part, that “at least one . . . processing module[] (M) requests at least one communication service . . . based on . . . at least one communication service identification, wherein said at least one communication service identification comprises at least one communication thread or at least one address range.” Thus, the request for the “at least one communication service” need not only be based on a communication thread or address range, but it must be based on a “communication service identification” that in turn must comprise “at least one communication thread or at least one address range.” For the reasons stated above, we agree with Patent Owner that Rădulescu2004 does not disclose a “communication service identification” that comprises a communication thread or address range. Thus, we determine that Petitioner’s showing for preamble recitation 6.pre.2 is insufficient and that Petitioner,

accordingly, has not met its burden to show by a preponderance of the evidence that claim 6 is anticipated by Rădulescu2004.

We nevertheless continue to analyze Petitioner’s showing for Ground 1 as a whole because, for Ground 2, Petitioner, in part, relies on its showing for Ground 1.

ii. Remaining Limitations

Patent Owner provides no counterarguments regarding preamble recitation 6.pre.1 or limitations 6.a, 6.b, and 6.c, and we determine that Petitioner has shown by a preponderance of the evidence that each is disclosed by Rădulescu2004. *See supra* Section III.D.3.a.i, iii–v.

We also determine that Petitioner has shown by a preponderance of the evidence that Rădulescu2004 discloses “mapping the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties,” as recited in limitation 6.d. Notwithstanding Patent Owner’s argument that “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” (PO Resp. 43), the Petition’s discussion of limitation 6.d refers back, for example, to its argument regarding limitation 6.b. Pet. 30. In that discussion, Petitioner cites disclosure in Rădulescu2004 that, *inter alia*, its router network “provide[s] transport layer services by defining connections . . . configured for specific properties (e.g., throughput, ordering),” and that the connections through which the disclosed Æthereal NoC offers its services “are composed of unidirectional point-to-point channels,” each having “properties . . . such as guaranteed message delivery or not, in order or unordered message delivery, and with or without timing guarantees” attached thereto. Pet. 27 (quoting Ex. 1005, 1, 2). Moreover, we agree with Petitioner

that Rădulescu2004's disclosure in this regard is consistent with the '052 patent's discussion of connections with connection properties. *Id.* at 28 (citing Ex. 1001, 4:65–5:5), 31 (citing Ex. 1001, 8:7–9:5); *see also id.* at 31 (“During prosecution of the '052 patent, the applicant asserted that Figure 4 ‘specifically illustrat[es] the operation of mapping (i.e., mapping means) of IP block communication via address ranges to connections.’” (quoting Ex. 1002, 142)). Nonetheless, because we find, for the reasons set forth in the discussion of preamble recitation 6.pre.2 above, that Rădulescu2004 does not disclose a “communication service identification . . . compris[ing] at least one communication thread or at least one address range,” we find that Rădulescu2004 also does not disclose mapping specifically “according to said at least one communication service identification.”

iii. Conclusion Regarding Claim 6

Because we find that Rădulescu2004 does not disclose a “communication service identification . . . compris[ing] at least one communication thread or at least one address range,” we conclude that Petitioner has not established by a preponderance of the evidence that Rădulescu2004 anticipates claim 6.

4. Claims 1 and 7

Limitations 1.f and 7.c each recite the same communication thread/address range limitation as in preamble recitation 6.pre.2. *See* Sections II.D, III.D.3.a.ii above. For these limitations, Petitioner relies on its showing for preamble recitation 6.pre.2. Pet. 33. Thus, for the reasons discussed above for claim 6, Petitioner also has not established that Rădulescu2004 anticipates claims 1 and 7.

5. *Claims 2 and 5*

Claims 2 and 5 each depend from claim 1. Ex. 1001, 9:51–10:6. For the reasons discussed above for claim 1, Petitioner has not established that Rădulescu2004 anticipates claims 2 and 5.

E. Ground 2: Asserted Obviousness over Rădulescu2004 and OCP

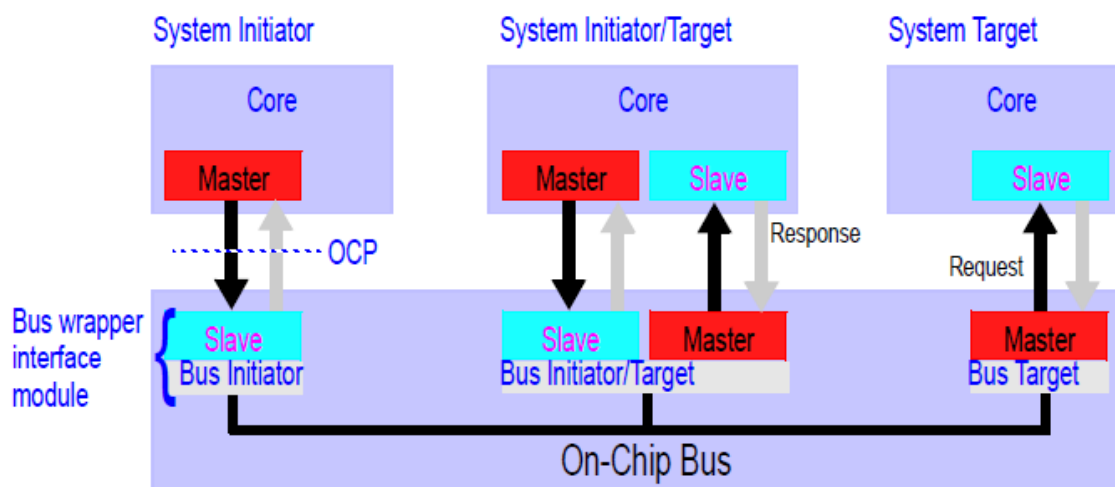
Petitioner argues that claims 1–7 would have been obvious over the combination of Rădulescu2004 and OCP. Pet. 3. We begin with a brief overview of OCP, followed by discussions of whether OCP qualifies as a prior-art printed publication and whether a person of ordinary skill in the art would have been motivated to combine Rădulescu2004 and OCP, and then conclude with discussion of Petitioner’s assertion that claims 1–7 are unpatentable over the combination of Rădulescu2004 and OCP.

1. *OCP*

OCP “addresses communications between the functional units (or IP cores) that comprise a system on a chip.” Ex. 1006, 19. OCP states that “[a]ny on-chip interconnect can be interfaced to the OCP.” *Id.* at 11.

Figure 1 of OCP is below:

Figure 1 System Showing Wrapped Bus and OCP Instances



Id. at 14. Figure 1 above “shows a simple system containing a wrapped bus and three IP core entities: one that is a system target, one that is a system initiator, and an entity that is both.” *Id.* “The characteristics of the IP core determine whether the core needs master, slave, or both sides of the OCP; the wrapper interface modules must act as the complementary side of the OCP for each connected entity.” *Id.*

Regarding signal groups, OCP explains that some OCP fields are grouped together because they must be active at the same time. The data flow signals are divided into three signal groups: request signals, response signals, and datahandshake signals. Ex. 1006, 38. Table 12 of OCP is below:

Table 12 OCP Signal Groups

Group	Signal	Condition
Request	MAddr	always
	MAddrSpace	always
	MBurst	always
	MByteEn	always
	MCmd	always
	MConnID	always
	MData*	datahandshake = 0
	MThreadID	always
Response	SData	always
	SResp	always
	SThreadID	always
Datahandshake	MData*	datahandshake = 1
	MDataValid	always
	MDataThreadID	always

*MData belongs to the request group, unless the datahandshake configuration parameter is enabled. In that case it belongs to the datahandshake group.

Id. Table 12 above provides a list of signals belonging to each signal group.
Id.

2. *Whether OCP Qualifies as a Prior-Art Printed Publication*

Petitioner contends that OCP was published in 2001 and is prior art under at least pre-AIA 35 U.S.C. § 102(a) and (b). Pet. 3. In support, Petitioner cites multiple references to the OCP in the '052 patent and in Rădulescu2004, as well as both an Affidavit (Exhibit 1013, “Frank-White Affidavit”) and Declaration (Exhibit 1019, “Frank-White Declaration”) of Nathaniel E. Frank-White, with accompanying exhibits. *Id.* (citing Ex. 1001, 2:65–3:2, 4:15–18, 6:30–38, 6:44–47, 8:41–46, 8:56–59; Ex. 1005, Abstract; Ex. 1013; Ex. 1019). Petitioner contends that the Frank-White Affidavit demonstrates public availability of OCP by August 2003 and that the Frank-White Declaration demonstrates public availability by October 2003. Pet. 3.

Mr. Frank-White testifies in both his Affidavit and his Declaration that he is “a Records Request Processor at the Internet Archive” and “make[s] this declaration of [his] own personal knowledge.” Ex. 1013 ¶ 1; Ex. 1019 ¶ 1. He testifies that the Internet Archive provides “a service known as the Wayback Machine” that allows visitors to browse archived versions of websites. Ex. 1013 ¶ 3; Ex. 1019 ¶ 3. He further testifies that “[i]f archived records for a URL [“Uniform Resource Locator,” or website address] are available, the visitor will be presented with a display of available dates,” and “[t]he visitor may select one of those dates, and begin browsing an archived version of the Web,” including navigation to archived versions of linked webpages and files. Ex. 1013 ¶ 3; Ex. 1019 ¶ 3. Mr. Frank-White further testifies that “[t]he archived data made viewable and browsable by the Wayback Machine is obtained by use of web archiving software that

automatically stores copies of files available via the Internet, each file preserved as it existed at a particular point in time.” Ex. 1013 ¶ 4; Ex. 1019 ¶ 4. Mr. Frank-White’s Affidavit includes as Exhibit B thereto a copy of OCP as archived at 12:03 a.m. and 12 seconds on August 28, 2003. Ex. 1013, 3–5; *see id.* ¶ 5 (explaining the format of the URL). Mr. Frank-White’s Declaration includes as Exhibit A thereto a copy of a webpage titled “OCP Specification” archived at 12:40 p.m. and 58 seconds on October 3, 2003, stating that “[t]he OCP Specification is freely available for research use” and providing a link to a click-through license agreement to be filled out to obtain the OCP Specification. Ex. 1019, 3–5; *See id.* ¶ 5 (explaining the format of the URL).

Patent Owner contends that Petitioner has failed to establish that OCP qualifies as prior art. PO Resp. 36–38; Sur-reply 28–29. According to Patent Owner, for example, “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” cited for support in the Petition. PO Resp. 36 (citing Pet. 3; *Acceleration Bay, LLC v. Activision Blizzard Inc.*, 908 F.3d 765, 772 (Fed. Cir. 2018)). Further, Patent Owner alleges, “Petitioner’s bald assertion that ‘OCP was published in 2001’ is inconsistent with its cited evidence.” *Id.* at 36–37 (citing Pet. 3; Ex. 1013; Ex. 1019). According to Patent Owner, “[t]he only possible support for Petitioner’s assertion is OCP’s copyright date of ‘2001,’ but this alone cannot establish public accessibility.” *Id.* at 37 (citing Pet. 3; Ex. 1006, 4; *Victoria’s Secret Stores LLC v. Andra Grp.*, IPR2020-00853, Paper 12 at 24–25 (PTAB Oct. 22, 2020); *Medivis, Inc. v. Novarad Corp.*, IPR2023-00042, Paper 35 at 27 (PTAB Mar. 6, 2024)). Referring to the Frank-White Affidavit and Declaration, Patent Owner argues that “the Affidavit concerns a PDF that was archived in August

2003,” but “Petitioner presents no evidence that interested POSITAs knew of the URL or would have been able to locate the PDF through reasonable diligence,” while “the Declaration concerns a webpage archived on October 3, 2003,” but “this webpage does *not* contain OCP (EX1006) and only contains hyperlinks, which also do not contain OCP.” *Id.* at 37–38 (citing Ex. 1013, 1–5; Ex. 1019, 1–5). Additionally, Patent Owner contends, OCP contains a statement of confidentiality and restricted use that, according to Patent Owner, shows that it was not publicly available. *Id.* at 38 (citing Ex. 1006, 4). Lastly, Patent Owner argues, “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.” *Id.* (citing Pet. 3; Ex. 1006, 1).

In the Reply, Petitioner responds that Patent Owner seeks to impose an improperly high standard of proof, pointing out again that the ’052 patent itself identifies “OCP” as an “existing” protocol and further that Rădulescu2004 refers to OCP Release 2.0 as an existing protocol, where, as Dr. Bagherzadeh acknowledged, “Release 2.0 came after Release 1.0.” Reply 7 (citing Ex. 1001, 6:30–38, 8:41–46; Ex. 1005, 6 n.18; Ex. 1050, 161:1–2). Petitioner contends OCP “also bears conventional indicia of publication,” including a 2001 copyright notice, consistent with the copy archived by the Wayback Machine, and still additional unrebutted evidence supports the availability of OCP prior to March 2004. *Id.* at 7–8 (citing Ex. 1006, 4; Ex. 1009, 45, 102, 111; Ex. 1013, 8; Ex. 1019, 5; Ex. 1038 ¶¶ 18–20; Ex. 1050, 35:25–36:4, 37:6–16).

Patent Owner argues in the Sur-reply that Exhibit 1006’s copyright date and Petitioner’s proffered Internet Archive printouts are insufficient and that “[t]he fact that OCP, in general, was known does not establish that this

particular OCP specification was accessible.” Sur-reply 28. Patent Owner further contends that “Petitioner’s reliance on Dr. Bagherzadeh’s testimony is flawed because it was not specifically tied to EX1006.” *Id.* (citing Reply 8; Ex. 1050, 35:25–36:4, 37:6–16).

Although the 2001 copyright date on the face of Exhibit 1006, standing alone, does not establish that OCP was accessible in 2001, we are persuaded by the Frank-White Affidavit that OCP was at least accessible by August 2003, well over a year before the earliest alleged priority date of the ’052 patent. Furthermore, notwithstanding Patent Owner’s argument suggesting that the ’052 patent refers only to the OCP *standard*, rather than to the OCP *specification* that is Ex. 1006, Patent Owner does not appear to dispute that Rădulescu2004—which, for reasons explained in Section III.D.2 above, we conclude was itself accessible more than a year before the ’052 patent’s priority date—expressly refers to Release 2.0 of the OCP specification or that Release 1.0 preceded Release 2.0. Although the Petition does not cite express evidence of accessibility, we are persuaded that the specification for a well-known standard would have been accessible to persons of ordinary skill in the art, and it is unrefuted on the record before us that Exhibit 1006 represents the first release of that standard. Accordingly, we are persuaded that OCP is a prior-art printed publication within the meaning of pre-AIA 35 U.S.C. § 102.

3. *Motivation to Combine Rădulescu2004 and OCP*

Petitioner argues that an ordinarily skilled artisan would have been motivated to combine the teachings of Rădulescu2004 with those of OCP because Rădulescu2004 expressly describes that its method and system is designed and intended to be compatible with the OCP protocol. Pet. 37. Petitioner asserts that Rădulescu2004 describes that its system was designed

“to provide backward compatibility to existing on-chip communication protocols,” and specifically identifies “OCP” as one of three such protocols. *Id.* (quoting Ex. 1005, 1).

Petitioner asserts that an ordinarily skilled artisan would have been motivated to look to OCP’s disclosure for the format and content of request messages that would be sent by system initiator modules to these adapters. Pet. 38. Petitioner argues that one of the Request signals is “MThreadID,” which “provides the thread identifier associated with the current transfer request.” *Id.* Further, Petitioner asserts that OCP describes numerous advantages of employing threads, including “support[ing] many different burst styles,” “support[ing] concurrent activity, and out-of-order completion of transfers,” and “enabl[ing] busy targets . . . to prioritize requests.” *Id.* (quoting Ex. 1006, 46, 181). Petitioner argues that Rădulescu2004 also teaches the advantages of using connection properties to improve performance of data transfer in an interconnection. *Id.* Petitioner further argues that an ordinarily skilled artisan would have reasonably expected the proposed combination of Rădulescu2004’s and OCP’s teachings to succeed. *Id.* at 39.

Patent Owner does not dispute that Rădulescu2004 references OCP as an “existing on-chip communication protocol[]” to which the described system was designed “to provide backward compatibility” (Ex. 1005, 1), but argues that Petitioner failed to demonstrate that an ordinarily skilled artisan would have been motivated to combine OCP’s “optional MAddr, MAddrSpace, and MThreadID signals” in Rădulescu2004. PO Resp. 45. According to Patent Owner, “Petitioner wrongly assumes that OCP’s MThreadID and MAddrSpace signals are always communicated by a master functional block,” whereas “OCP is clear that the MThreadID and

MAddrSpace signals are *optional* and are not necessary in every OCP request.” *Id.* at 45–46 (citing Pet. 38, 42; Ex. 1006, 15, 23, 26, 27, 38; Ex. 2070 ¶¶ 176, 182). “Petitioner’s arguments are flawed,” Patent Owner argues, “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.” *Id.* at 46. Still further, Patent Owner alleges, “[e]ven 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.” *Id.* at 47–52. For example, Patent Owner contends, “[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,” and “Rădulescu2004 already allows for ‘identify[ing] a system target . . . and/or a memory region within the system target,’ such that ‘introducing OCP’s MAddrSpace is not necessary.” *Id.* at 48 (citing Ex. 1005, 4; Ex. 2068, 98:22–24, 100:3–5, 140:3–24; Ex. 2070 ¶¶ 181–186, 206–207), 51 (citing Ex. 2070 ¶¶ 176–180). Lastly, Patent Owner argues that Rădulescu2004 and OCP describe different types of “connections.” *Id.* at 52–53. Specifically, according to Patent Owner, “[n]etwork-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,” and “[t]he difference between OCP transactions and packet transmission is evident from the disclosure in the [’]052 Patent.” *Id.* at 52.

After reviewing the record, including Petitioner’s and Patent Owner’s counterarguments at Reply 14–18 and Sur-reply 12–13, we determine that

Petitioner has set forth a sufficient rationale for combining Rădulescu2004's and OCP's teachings. It is undisputed on the record before us that Rădulescu2004 references OCP as an "existing on-chip communication protocol[]" to which the described system was designed "to provide backward compatibility." Ex. 1005, 1. Notwithstanding Patent Owner's arguments that OCP signals such as MAddrSpace and MThreadID are "optional," Rădulescu2004 does not state, for example, that it is designed to provide backward compatibility with OCP only to those signals in OCP that are required to always be communicated. As Petitioner argues, "[a]n interconnect designed to provide 'backward compatibility' with OCP would need to support all signals employed in OCP, including optional ones such as MAddrSpace." Reply 15; *see also id.* at 15–16 ("The fact that MThreadID is referred to as 'optional' in OCP does not overcome Petitioner's showing of obviousness. . . . A [person of ordinary skill in the art] would know that to provide 'backward compatibility' with OCP as taught by Rădulescu2004, the interconnect would need to support all signals of OCP, including optional ones.").

With regard to Patent Owner's argument that Rădulescu2004 already provides the benefits that OCP's threads would in the combination, as Petitioner points out, "[e]ven if [Patent Owner's] assertion were true, just because there is one known way to obtain known benefits does not mean that other ways are not obvious." Reply 16 (citing *KSR*, 550 U.S. at 421; *Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1380 (Fed. Cir. 2023)); *see also Intel Corp. v. Qualcomm Inc.*, 21 F.4th 784, 800 (Fed. Cir. 2021) ("It's not necessary to show that a combination is 'the *best* option, only that it be a *suitable* option.'" (quoting *PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1197–98 (Fed. Cir. 2014))).

4. *Claim 6*

For claim 6, Petitioner relies principally on its showing for Ground 1. *See* Pet. 39–44. In addition, however, Petitioner provides further arguments for certain limitations of claim 6 in the event its showing for those limitations for Ground 1 is determined to be insufficient. *Id.* at 36, 39–44. As set forth in Section III.D.3 above, we determined that Petitioner’s showing for Ground 1 for all limitations of claim 6 is sufficient with the exception of Petitioner’s showing with respect to the communication thread/address range limitation in preamble recitation 6.pre.2.

For preamble recitation 6.pre.2, Petitioner argues, *inter alia*, that “OCP discloses communication service requests based on communication service identifiers that include **both** a thread and an address range.” Pet. 41 (citing Ex. 1003 ¶ 172). Petitioner asserts that, “[a]s shown in OCP’s Table 12, 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’).” *Id.* at 41–42 (citing Ex. 1003 ¶ 172; Ex. 1006, 24, 26, 28, 38). Petitioner contends that an ordinarily skilled artisan “would have understood that MAddr and MAddrSpace identify a system target (i.e., second processing module) and/or a memory region within the system target.” *Id.* at 42. Petitioner further argues that an ordinarily skilled artisan “would have understood that MAddr and MAddrSpace identify a system target (*i.e.*, second processing module) and/or a memory region within a system target” and “would have been motivated to implement the OCP protocol in the system of Rădulescu2004, including its threads and address range teachings, as . . . Rădulescu2004 expressly identifies OCP as one of the existing protocols with which its NOC is compatible, and would have had a reasonable expectation of success.” *Id.* (citing Ex. 1003 ¶¶ 154–161, 172).

For limitation 6.d, Petitioner argues that an ordinarily skilled artisan “would have found it obvious for an OCP adapter in the network interface of Rădulescu2004 to map the OCP address signals (‘MAddr,’ ‘MAddrSpace’) in request from system initial IP cores to connections through Rădulescu2004’s NoC.” Pet. 43 (citing Ex. 1003 ¶¶ 174–175). In addition, Petitioner contends, “mapping requests to connections according to a communication service identification comprising a Thread ID would have been obvious in view of OCP.” *Id.* (citing Ex. 1003 ¶ 176). As discussed in connection with preamble recitation 6.pre.2, Petitioner argues, “OCP describes that requests from a system initiator may include a thread ID.” *Id.* (citing Ex. 1003 ¶¶ 156–157; Ex. 1006, 22, 181). Furthermore, according to Petitioner, OCP, like Rădulescu2004, “describes the use of ‘connections,’ for the transfer of requests with specified communication properties over an interconnect,” and “further explains that the thread identifier (MThreadID) is mapped to a connection identifier (MConnID) during the request phase.” *Id.* at 43–44 (citing Ex. 1003 ¶¶ 158, 176–177; Ex. 1006, 22, 47, 120, 180–81). Thus, Petitioner contends, a person of ordinary skill in the art “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.” *Id.* at 44 (citing Ex. 1003 ¶ 176).

The skilled artisan also would have found it obvious to map both the OCP address signals and OCP thread identifier to the connections of Rădulescu2004, according to Petitioner, because these mappings serve different, though complementary, purposes: “As described in Ground 1, 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”; and “[b]y contrast, mapping OCP threads to Rădulescu2004’s connections enables thread-based ordering and priority to be communication through the NoC ‘between a system initiator and a system target.’” Pet. 44 (citing Ex. 1003 ¶ 177; Ex. 1006, 180–81).

Responding to Petitioner’s contentions, Patent Owner raises two arguments: First, as discussed in Section III.E.3 above, Patent Owner contends that Petitioner failed to demonstrate that an ordinarily skilled artisan would have been motivated to combine OCP’s MAddr, MAddrSpace, and MThread signals with Rădulescu2004’s system. PO Resp. 45. Second, Patent Owner asserts that Petitioner “failed to demonstrate that . . . OCP cures the deficiencies of Rădulescu2004 with respect to the ‘mapping’ requirement.” *Id.* Patent Owner does not clearly articulate this second argument distinctly from its argument concerning alleged lack of motivation to combine. *See generally id.* at 45–53. As best that we can discern, however, Patent Owner’s argument in this regard appears to be that Rădulescu2004 describes network-based connections that transmit packets in the networking layer of the OSI model, whereas OCP is a “connectionless” protocol that “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,” and that, as a consequence, combining OCP with Rădulescu2004’s system “would render Rădulescu2004 inoperable for its intended purpose (i.e., transmitting packet in a network on a chip).” *Id.* at 52–53.¹⁰ Patent Owner further contends, “[t]his includes OCP’s disclosure

¹⁰ This identification is supported by Patent Owner’s Sur-reply, which refers to pages 52–53 of the Response under the heading “OCP Does Not Cure the Deficiencies of Rădulescu2004.”

of ‘mapping’ a connection ID to a thread ID, as incorrectly suggested by Petitioner because OCP discloses that the ‘mapping’ occurs in the interfaces,” which, according to Patent Owner, “are incompatible with Rădulescu2004’s network because OCP signals cannot be sent directly over Rădulescu2004’s network.” *Id.* at 53 (citing Pet. 43–44; Ex. 1005, 4; Ex. 1006, 47; Ex. 2070 ¶¶ 188–190).

In its Reply, Petitioner argues that this ground “does not call for use of OCP’s connections in Radulescu2004’s system,” as “Radulescu2004 discloses the connections.” Reply 17 (citing Pet. 43 (Ground 2 referring back to arguments for Ground 1 with respect to limitation 6.b); Ex. 1030 ¶ 47). Furthermore, Petitioner argues, “[w]hether OCP is a connectionless communication protocol or uses packets is not an issue for compatibility with Radulescu2004,” as “Radulescu2004 expressly teaches that it is backward compatible with OCP.” *Id.* at 17–18 (citing Ex. 1005, 1; Ex. 1030 ¶¶ 48–49). And “[e]ven if the ‘mapping’ element were construed as narrowly as [Patent Owner] is now arguing it should be,” Petitioner contends, “it would have been obvious in view of Radulescu2004 and OCP,” because “OCP teaches that MThreadID is mapped to a connection identifier (MConnID), and a [person of ordinary skill in the art] would have found it obvious for the OCP adapter in the network interface of Radulescu2004 to map the MThreadID in requests to the analogous connections in Radulescu2004’s system.” *Id.* at 18 (citing Ex. 1003 ¶ 158; Ex. 1030 ¶ 50). Moreover, Petitioner argues, “mapping OCP threads to Radulescu2004’s connections was known to allow thread-based ordering and priority to be communicated through the NoC, including the *implementation* of Radulescu2004’s ‘differentiated traffic classes,’” and a person of ordinary skill in the art “would have known the whole point of connections with ordering or high priority was for mapping of

requests with those properties.” *Id.* at 18–19 (citing Pet. 44; Ex. 1003 ¶ 177; Ex. 1030 ¶ 50).

After reviewing the record, we determine that Petitioner has established by a preponderance of the evidence that claim 6 is unpatentable over the combination of Rădulescu2004 and OCP. For the reasons stated in Section III.D.3.c above, we find that Rădulescu2004 discloses all limitations of claim 6 other than a “communication service identification . . . compris[ing] at least one communication thread or at least one address range,” and we are persuaded by Petitioner’s arguments and evidence that that remaining limitation is taught by OCP and that a person of ordinary skill in the art would have been motivated to combine OCP’s teachings with Rădulescu2004 and would have had a reasonable expectation of success in doing so. *See KSR*, 550 U.S. at 417 (“[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.”).

5. *Claims 1 and 7*

For claims 1 and 7, Petitioner relies on its showing for claim 6 for Ground 2 and its showings for claims 1, 6, and 7 for Ground 1. Pet. 45–46; *see also id.* at 39–44. For Ground 1, Petitioner sets forth how it contends Rădulescu2004 discloses the differences between claims 1 and 7 and claim 6. *Id.* at 32–36. In particular, Petitioner contends that Rădulescu2004 discloses a data processing system, as recited in the preamble of claim 7, citing disclosure in Rădulescu2004 that the communication services of the Æthereal NoC are defined to meet goals that include “decoupl[ing] computation (IP modules) from communication (NoC)” and describing “video pixel processing.” *Id.* at 32–33 (citing Ex. 1003 ¶ 152; Ex. 1005, Abstract, 1–5).

With regard to the “mapping means” limitations of claims 1 and 7 (i.e., limitations 1.e and 7.f), Petitioner relies on its showing with respect to limitation 6.d for the corresponding function and further contends that Rădulescu2004 discloses the same structure as disclosed in the ’052 patent—specifically, adapter units, or “shells,” that include a sequentializer and a desequentializer and may be located within a network interface. *Id.* at 34–35 (citing Ex. 1001, 5:58–6:3, 6:39–55, Figs. 2A, 3; Ex. 1003 ¶¶ 145–146; Ex. 1005, 1–5, Figs. 1, 5). Indeed, Petitioner points out, “some of the descriptions [in Rădulescu2004] are nearly identical” to those in the ’052 patent. *Id.* at 35–36 (comparing Ex. 1005, 5 with Ex. 1001, 6:48–53).

Patent Owner presents no counterarguments for Grounds 1 and 2 that are specific to claims 1 and 7.

For the reasons set forth in Section III.E.4 above with respect to claim 6, in further view of Petitioner’s additional arguments with respect to the preamble of claim 7 and limitations 1.e and 7.f, we determine that Petitioner has shown by a preponderance of the evidence that claims 1 and 7 are unpatentable over the combination of Rădulescu2004 and OCP.

6. Claim 2

Claim 2 depends from claim 1 and further recites, “wherein said mapping means (A) is arranged in said at least one network interface.” Ex. 1001, 9:51–53. For Ground 2, Petitioner relies on its showing for Ground 1 that Rădulescu2004 discloses this limitation. Pet. 46. In particular, for Ground 1, Petitioner argues that Rădulescu2004’s adapter/shell (i.e., mapping means (A)) “is part of (and therefore ‘arranged in’) the network interface.” *Id.* at 36 (citing Ex. 1003 ¶¶ 148–149; Ex. 1005, 4–5 (describing that the network interface comprises “the NI kernel” and “the NI shells, which implement the connections.”), Fig. 1).

Patent Owner presents no counterargument specific to claim 2.

For the reasons set forth in Section III.E.5 above with respect to claim 1, in further view of Petitioner’s additional arguments above with respect to the additional limitation of claim 2, we determine that Petitioner has shown by a preponderance of the evidence that claim 2 is unpatentable over the combination of Rădulescu2004 and OCP.

7. *Claims 3 and 4*

Claim 3 depends from claim 1 and further recites “wherein said at least one communication thread is mapped to at least one connection based on a set of connection properties.” Ex. 1001, 9:54–56. Claim 4 depends from claim 3 and additionally recites “wherein said communication service identification further comprises at least one address range in said at least one second processing module (S), wherein said at least one address range is mapped to at least one connection based on a set of connection properties.” *Id.* at 9:57–10:3. Petitioner contends that the limitation recited in claim 3 would have been obvious over Rădulescu2004 and OCP, relying on its showing with respect to the mapping of OCP threads to the connections of Rădulescu2004 in connection with limitation 6.d. Pet. 46 (citing Ex. 1003 ¶ 180); *see supra* Section III.E.4. Petitioner contends that the limitation recited in claim 4 likewise would have been obvious for the reasons provided for preamble recitation 6.pre.2 and limitation 6.d. In particular, Petitioner argues, a person of ordinary skill in the art “would have understood that the address signals of OCP comprise an address range in the system target IP module (i.e., second processing module), as OCP describes that the MAddrSpace ‘is used to indicate the address region of a transfer,’ which may be the ‘the register space [or] the regular memory space of a target core.’” *Id.* at 46–47 (quoting Ex. 1006, 26) (citing Ex. 1003 ¶ 181).

Patent Owner presents no counterarguments specific to claims 3 and 4.

For the reasons set forth in Section III.E.4 above with respect to claim 6, in further view of Petitioner’s additional arguments above and in section III.E.4 with respect to preamble recitation 6.pre.2 and limitation 6.d, we determine that Petitioner has shown by a preponderance of the evidence that claims 3 and 4 are unpatentable over the combination of Rădulescu2004 and OCP.

8. *Claim 5*

Claim 5 depends from claim 1 and further recites, “wherein said at least one address range is mapped to at least one connection based on a set of connection properties.” Ex. 1001, 10:4–6. Petitioner contends that this limitation would have been obvious over Rădulescu2004 and OCP, relying on its showing with respect to the mapping of OCP address signals to the connections of Rădulescu2004 in connection with limitation 6.d. Pet. 47 (citing Ex. 1003 ¶ 182); *see supra* Section III.E.4.

Patent Owner presents no counterargument specific to claim 5.

For the reasons set forth in Section III.E.5 above with respect to claim 1, in further view of Petitioner’s arguments in section III.E.4 with respect to limitation 6.d, we determine that Petitioner has shown by a preponderance of the evidence that claim 5 is unpatentable over the combination of Rădulescu2004 and OCP.

F. *Weber-based Grounds*

Petitioner argues that Weber anticipates claims 1–7. Pet. 3. Because we conclude that the challenged claims are unpatentable on another ground (*see supra* § III.E), we do not reach these additional grounds. *See SAS Inst. Inc. v. Iancu*, 584 U.S. 357, 371 (2018) (holding that a petitioner “is entitled to a final written decision addressing all of the claims it has challenged”);

Boston Sci. Scimed, Inc. v. Cook Grp. Inc., 809 F. App'x 984, 990 (Fed. Cir. 2020) (recognizing that the “Board need not address issues that are not necessary to the resolution of the proceeding” and, thus, agreeing that the Board has “discretion to decline to decide additional instituted grounds once the petitioner has prevailed on all its challenged claims”).

IV. PATENT OWNER’S MOTION TO SUBMIT SUPPLEMENTAL INFORMATION

Patent Owner moved to submit supplemental information in the form of deposition testimony from a witness proffered by Petitioner in IPR2024-00338,¹¹ concerning the meaning of the term “hop,” which Patent Owner contends to be relevant to the construction of the term “interconnect means.” Paper 45, 1. Because our conclusions in this Decision do not turn on the meaning of the term “hop,” we need not and do not resort to extrinsic evidence on this topic. Therefore, we dismiss Patent Owner’s motion to introduce this extrinsic evidence. *Samsung Elecs. Co. v. Netlist, Inc.*, IPR2022-00615, Paper 96 at 52–53 (PTAB Apr. 17, 2024) (dismissing motion to submit supplemental information).

V. PETITIONER’S MOTION TO EXCLUDE

Petitioner moved to exclude Exhibit 2065, titled “IEEE Terms & Disclosures for Use of IEEE Websites,” submitted by Patent Owner. Paper 56, 1–2. Because we do not rely on Exhibit 2065 in our analysis in a manner adverse to Petitioner, we dismiss the Motion to Exclude as moot. *See, e.g., Netflix, Inc. v. GoTV Streaming, LLC*, IPR2023-00757, Paper 39

¹¹ As noted above, IPR2024-00338, which Patent Owner identifies as a related matter, involves the same parties but concerns a different patent that names the same inventors but issued from an otherwise unrelated application. *See supra* Section II.B.

at 135 (PTAB Nov. 5, 2024) (dismissing motion to exclude evidence as moot); *Volkswagen Grp. of Am., Inc. v. Spero*, IPR2023-00335, Paper 40 at 24 (PTAB July 15, 2024) (dismissing motion to exclude as moot); *Samsung v. Netlist*, Paper 96 at 53 (dismissing motion to exclude as moot).

VI. CONCLUSION

For the foregoing reasons, we are persuaded that Petitioner has established by a preponderance of the evidence that claims 1–7 of the '052 patent are unpatentable.¹²

In summary:

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1, 2, 5–7	102	Rădulescu2004		1, 2, 5–7
1–7	103	Rădulescu2004, OCP	1–7	
1–7	102	Weber ¹³		
1–7	103	Weber, Rădulescu2004 ¹⁴		

¹² Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

¹³ As explained above, we do not reach this ground. See *supra* § III.F.

¹⁴ As explained above, we do not reach this ground. See *supra* § III.F.

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
Overall Outcome			1–7	

VII. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–7 of the '052 patent have been shown to be unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Submit Supplemental Information (Paper 45) is dismissed;

FURTHER ORDERED that Petitioner's Motion to Exclude (Paper 56) is dismissed; and

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

IPR2024-00343
Patent 7,594,052 B2

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EXHIBIT B

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

QUALCOMM INCORPORATED,
Petitioner,

v.

NETWORK SYSTEM TECHNOLOGIES, LLC,
Patent Owner.

IPR2024-00343
Patent 7,594,052 B2

Before CHARLES J. BOUDREAU, STEVEN M. AMUNDSON, and
IFTIKHAR AHMED, *Administrative Patent Judges*.

BOUDREAU, *Administrative Patent Judge*.

DECISION

Denying Patent Owner's Request on Rehearing of Final Written Decision
37 U.S.C. § 42.71(d)

I. INTRODUCTION

Network System Technologies, LLC (“Patent Owner” or “NST”) requests rehearing of the Board’s June 13, 2025, Final Written Decision determining that claims 1–7 of U.S. Patent No. 7,594,052 B2 (Ex. 1001, “the ’052 patent”) are unpatentable (Paper 65, “Final Dec.”). Paper 66 (“Req. Reh’g”).

According to 37 C.F.R. § 42.71(d), “[t]he burden of showing a decision should be modified lies with the party challenging the decision,” and the “request must specifically identify all matters the party believes the Board misapprehended or overlooked.” The burden here, therefore, lies with NST to show we misapprehended or overlooked the matters it requests that we review.

For the reasons explained below, we deny Patent Owner’s request.

II. ANALYSIS

A. *Procedural History*

Qualcomm Incorporated (“Qualcomm” or “Petitioner”) and Samsung Electronics Co., Ltd. (“Samsung”) filed a Petition for *inter partes* review of claims 1–7 (“the challenged claims”) of the ’052 patent on December 19, 2023, pursuant to 35 U.S.C. § 311 et seq. Paper 3 (“Pet.”). After considering the Petition, a Preliminary Response filed by NST (Paper 7), a Preliminary Reply filed by Qualcomm and Samsung (Paper 9), and a Preliminary Sur-reply filed by NST (Paper 10), the Board instituted an *inter partes* review of the challenged claims in a June 21, 2024, Decision on Institution (Paper 11).

After institution, Samsung and NST reported that they had entered into a confidential settlement agreement resolving the dispute between them, and the Board granted a joint motion to terminate Samsung from the

proceeding. Paper 25. Thereafter, NST filed a Response to the Petition (Paper 38, “PO Resp.”), Qualcomm filed a Reply (Paper 48, “Reply”), and NST filed a Sur-reply (Paper 55, “Sur-reply”). We held an oral hearing in this proceeding on March 20, 2025, and the transcript is entered into the record. Paper 64 (“Tr.”).

Following consideration of the parties’ respective arguments and the trial record, we issued a Final Written Decision concluding that Qualcomm had demonstrated by a preponderance of evidence that all of the challenged claims are unpatentable under 35 U.S.C. § 103(a) over the combination of A. Rădulescu et al., *An Efficient On-Chip Network Interface Offering Guaranteed Services, Shared-Memory Abstraction, and Flexible Network Configuration*, Proceedings of the Design, Automation and Test in Europe Conference and Exhibition, 2004 (Ex. 1005, “Rădulescu2004”) and Open Core Protocol Specification, Release 1.0, OCP-IP Association (2001) (Ex. 1006, “OCP”). *See* Final Dec. 10–70, 72.

B. The Challenged Claims

Of the challenged claims, claims 1, 6, and 7 are independent. In their briefing, the parties focused on claim 6, which reads as follows:¹

6. [6.pre.1] Method of communication service mapping in an integrated circuit, having a plurality of processing modules (M, S), [6.pre.2] wherein at least one first of said processing modules (M) requests at least one communication service to at least one second processing module (S) based on specific communication properties and *at least one communication service identification*, wherein said at least one communication service identification comprises at least one

¹ For ease of reference, we refer to bracketed designations provided in the Petition for the preamble recitations and limitations of the challenged claims. *See* Pet. 83–86.

communication thread or at least one address range, said address range for identifying one or more second processing modules (S) or a memory region within said one or more second processing modules (S), comprising the steps of:

[6.a] coupling said plurality of processing modules (M, S) by an interconnect means (N) and

[6.b] enabling a connection based communication having a set of connection properties,

[6.c] controlling the communication between said at least one first of said plurality of processing modules (M) and said interconnect means (N) by at least one network interface (NI) associated to said at least one first of said processing modules,

[6.d] 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*.

Ex. 1001, 10:7–32 (emphasis added). Like limitation 6.d, limitations 1.e and 7.f of claims 1 and 7, respectively, recite “a mapping means (A) for *mapping the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties according to said at least one communication service identification*.” *Id.* at 9:41–50, 10:54–58 (emphasis added).

C. The Final Written Decision

In the Final Written Decision, we found that Petitioner demonstrated by a preponderance of the evidence that Rădulescu2004 discloses limitations 6.a, 6.b, 6.c, and “mapping the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties,” as recited in limitation 6.d. Final Dec. 52–53. We further found, however, that Petitioner had not made a sufficient showing that Rădulescu2004 discloses a communication

service identification that includes “at least one communication thread or at least one address range,” as recited in the preamble of claim 6 (and similarly in the preamble of claim 7). *Id.* at 50–51. We did not make an express determination whether the preamble recitation is limiting; nonetheless, because the recitation of the communication service identification in the preamble of claim 6 provides antecedent basis for the later recitation “according to said at least one communication service identification” in limitation 6.d, we found that Rădulescu2004 failed to disclose mapping specifically “according to said at least one communication service identification,” as limitation 6.d recites. *Id.* at 53. Therefore, we concluded that Petition did not establish by a preponderance of the evidence that claim 6 (or, likewise, any of the remaining challenged claims) was anticipated by Rădulescu2004. *Id.* at 53–54. Notwithstanding our conclusion that Petitioner did not establish that any of the challenged claims were anticipated by Rădulescu2004, however, we determined that Petitioner established by a preponderance of the evidence that all of the challenged claims were unpatentable as obvious over the combination of Rădulescu2004 and OCP. Final Dec. 63–71.

D. NST’s Arguments on Rehearing

In the Request for Rehearing, NST argues that, in concluding that the challenged claims are unpatentable over the combination of Rădulescu2004 and OCP, the Final Written Decision “misapprehended or overlooked its earlier finding in Ground 1 [i.e., anticipation by Rădulescu2004] that because Rădulescu2004 does not disclose limitation 6.pre.b, which requires a ‘communication service identification,’ Rădulescu2004 necessarily does not disclose limitation 6.d, which requires ‘mapping . . . according to said at

least one communication service identification,” and that, “[a]s a result, the Decision misapprehended or overlooked Patent Owner’s arguments and evidence showing that even if Rădulescu2004 and OCP were combined as proposed in the Petition, Petitioner did not show that this combination would satisfy the ‘mapping’ recited in limitation 6.d.” Req. Reh’g 1. More particularly, NST argues, “[i]n rejecting Petitioner’s challenge under Ground 1, the Decision found that Rădulescu2004 does not disclose either (1) the ‘communication service identification’ recited in limitation 6.pre.b or (2) the ‘mapping . . . according to said at least one communication service identification’ recited in limitation 6.d,” but “in Ground 2 [i.e., obviousness over Rădulescu2004 and OCP], the Decision overlooked its finding in Ground 1 . . . and incorrectly stated that Rădulescu2004 discloses all limitation[s] of claim 6 except the ‘communication service identification’ in the preamble.” *Id.* at 1–2 (citing Final Dec. 50–51, 67).

NST further contends that “the Board should rehear its finding that Rădulescu2004 and OCP disclose limitation 6.d,” arguing that

Patent Owner presented arguments and evidence that even if (1) OCP discloses an address range or communication thread as recited by limitation 6.pre.b and (2) a [person of ordinary skill in the art] would have been motivated to combine Rădulescu2004 and OCP, that combination would not cure Rădulescu2004’s failure to disclose the “mapping . . . according to said at least one communication service identification” as required in limitation 6.d. . . .

The Decision’s statement that Rădulescu2004 discloses “*all* limitations” except the “communication service identification” overlooks the Decision’s finding in Ground 1 that “Rădulescu2004 also does not disclose mapping specifically ‘according to said at least one communication service identification’” as required in limitation 6.d. In other words, for

Ground 2, the Decision appears to have incorrectly assumed that Rădulescu2004 discloses limitation 6.d. . . .

This oversight led the Decision to overlook or misapprehend key arguments and evidence showing that, like Rădulescu2004, O[CP] does not disclose the claimed “mapping.”

Req. Reh’g 4–5 (title case omitted) (internal citations omitted) (citing PO Resp. 47–53; Sur-reply 14–15; Tr. 48:8–49:11, 50:21–23; Final Dec. 52, 61–67).

E. Discussion

We have considered NST’s arguments but find them unpersuasive. As an initial matter, notwithstanding NST’s assertion, the Final Written Decision does not state that Rădulescu2004 discloses all limitations of claim 6 “except the ‘communication service identification’ *in the preamble*” but instead that, “[f]or the reasons stated in Section III.D.3.c above,^[2] we find that Rădulescu2004 discloses all limitations of claim 6 other than a ‘communication service identification . . . compris[ing] at least one communication thread or at least one address range.’” Final Dec. 67. As NST points out, “[b]ased on antecedent basis, the phrase ‘said at least one communication service identification’ in limitation 6.d unquestionably refers to the same ‘communication service identification’ recited in limitation 6.pre.b, which the Decision found Rădulescu2004 does not disclose.” Req. Reh’g 4. Read in context, our finding in the Final Written Decision that “Rădulescu2004 discloses all limitations of claim 6 other than a ‘communication service identification . . . compris[ing] at least one communication thread or at least one address range’” refers to *both instances*

² “Section III.D.3.c” refers to the discussion of the Rădulescu2004 anticipation ground in the Final Written Decision.

of that phrase in claim 6—i.e., not only that “in the preamble,” but also the recitation of “communication service identification” in limitation 6.d. Final Dec. 67.

Contrary to NST’s arguments, the analysis of Ground 2 in the Final Written Decision did not “overlook[] the Decision’s finding in Ground 1” or “assume[] that Rădulescu2004 discloses” the entirety of limitation 6.d. In the discussion of the Ground 1, we found that Rădulescu2004 discloses only a portion of limitation 6.d—namely, “mapping the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties”:

We . . . determine that Petitioner has shown by a preponderance of the evidence that Rădulescu2004 discloses “mapping the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties,” as recited in limitation 6.d. . . . Nonetheless, because we find, for the reasons set forth in the discussion of preamble recitation 6.pre.2 above, that Rădulescu2004 does not disclose a “communication service identification . . . compris[ing] at least one communication thread or at least one address range,” we find that Rădulescu2004 also does not disclose mapping specifically “according to said at least one communication service identification.”

Final Dec. 52–53. Consistent with that determination with respect to Ground 1, we explained in the analysis of Ground 2 that “we are persuaded by Petitioner’s arguments and evidence that *that remaining limitation*”—referring specifically to the “communication service identification . . . compris[ing] at least one communication thread or at least one address range” recited in the preamble and referenced in limitation 6.d—“is taught by OCP and that a person of ordinary skill in the art would have been motivated to combine OCP’s teachings with Rădulescu2004 and would have

had a reasonable expectation of success in doing so.” *Id.* at 67 (emphasis added).

Notwithstanding NST’s further arguments, we also are not persuaded that the Final Written Decision overlooked or misapprehended evidence that, for example, “OCP cannot disclose the claimed ‘mapping,’” or alleged “inconsistencies in Petitioner’s arguments” regarding OCP’s disclosures. *See* Req. Reh’g 6–7. As set forth in the Final Written Decision, we found with respect to the “communication service identification” recited in the preamble of claim 6 and limitation 6.d, that Petitioner had persuasively shown that OCP discloses communication service requests based on communication service identifiers that include both a thread and an address range, as further recited in the preamble of claim 6, and that a person of ordinary skill in the art would have been motivated to implement the OCP in the system of Rădulescu2004, including its disclosed threads and address range teachings, particularly given that Rădulescu2004 itself expressly identifies OCP as an existing protocol with which its network on chip (“NOC”) is compatible. *See* Final Dec. 63 (citing, e.g., Pet. 41–42; Ex. 1003 ¶ 172; Ex. 1006, 24, 26, 28, 38), 67. With respect to limitation 6.d in particular, we were persuaded by Petitioner’s arguments that a person of ordinary skill “would have found it obvious for an OCP adapter in the network interface of Rădulescu2004 to map the OCP address signals (‘MAddr,’ ‘MAddrSpace’) in request from system initial IP cores to connections through Rădulescu2004’s NoC” and that “mapping requests to connections according to a communication service identification comprising a Thread ID would have been obvious in view of OCP,” which, like Rădulescu2004, “describes the use of ‘connections,’ for the transfer of requests with specified communication properties over an

interconnect,” and “further explains that the thread identifier (MThreadID) is mapped to a connection identifier (MConnID) during the request phase.” *Id.* at 64 (quoting Pet. 43–44 (citing Ex. 1003 ¶¶ 174–177; Ex. 1006, 22, 47, 120, 180–81)), 67. Contrary to NST’s arguments, we discern no inconsistency in Petitioner’s arguments that OCP discloses communication service identifiers that include both a thread and an address range and that a person of ordinary skill in the art would have been motivated to implement OCP’s teachings in the system of Rădulescu2004, on the one hand, and its explanation that the combination does not call for the bodily incorporation of OCP’s interfaces in Rădulescu2004’s system, on the other. *See* Pet. 41–42; Ex. 1030 ¶ 47; *see also In re Keller*, 642 F.2d 413, 425 (CCPA 1981) (“The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference Rather, the test is what the combined teachings of those references would have suggested to those of ordinary skill in the art.”).

A request for rehearing is not an opportunity merely to disagree with the panel’s assessment of the arguments or weighing of the evidence. In reaching our conclusions in the Final Written Decision, we fully considered the trial record, including all arguments and evidence presented by NST, and determined, upon weighing the evidence, that Petitioner demonstrated by a preponderance of the evidence that the challenged claims are unpatentable over the combined teachings of Rădulescu2004 and OCP. We have considered but are not persuaded by NST’s arguments that we misapprehended or overlooked the matters raised on rehearing, and we see no reason to disturb our Final Written Decision.

III. CONCLUSION

In conclusion, the Request for Rehearing does not demonstrate that the Final Written Decision misapprehended or overlooked any matters in the case.

Outcome of Decision on Rehearing:

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Denied	Granted
1–7	103	Rădulescu2004, OCP	1–7	

Final Outcome after Rehearing:

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1, 2, 5–7	102	Rădulescu2004		1, 2, 5–7
1–7	103	Rădulescu2004, OCP	1–7	
1–7	102	Weber ³		
1–7	103	Weber, Rădulescu2004 ⁴		
Overall Outcome			1–7	

³ As explained in the Final Written Decision, we do not reach this ground. See Final Dec. 70–71.

⁴ As explained in the Final Written Decision, we do not reach this ground. See Final Dec. 70–71.

IV. ORDER

Accordingly, it is

ORDERED that the Request for Rehearing is *denied*.

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