

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 REQUEST FOR REHEARING

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LISTING OF EXHIBITS

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2001	WITHDRAWN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

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

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	Tex.), Dkt. 100 (Feb. 20, 2024)
2035	Defendant Samsung Electronics Co., Ltd.'s Responsive Claim Construction Brief, <i>Network System Technologies, LLC v. Samsung Electronics Co., Ltd.</i> , Civil Action No. 2:22-cv-00482-RWS (E.D. Tex.), Dkt. 112 (March 12, 2024)
2036	Plaintiff Network System Technologies, LLC's Reply Construction Brief, <i>Network System Technologies, LLC v. Samsung Electronics Co., Ltd.</i> , Civil Action No. 2:22-cv-00482-RWS (E.D. Tex.), Dkt. 116 (March 19, 2024)
2037	Complaint, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.) Dkt. 1 (Dec. 19, 2022)
2038	First Amended Complaint, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.) Dkt. 57 (Aug. 7, 2023)
2039	Second Amended Scheduling Order, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.) Dkt. 80 (Oct. 23, 2023)
2040	Defendants' Joint Opening Claim Construction Brief, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.), Dkt. 77 (Oct. 12, 2023)
2041	Plaintiff Network System Technologies, LLC's Responsive Claim Construction Brief, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.), Dkt. 81 (Nov. 16, 2023)
2042	Defendants' Joint Reply Claim Construction Brief, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.), Dkt. 83 (Nov. 30, 2023)
2043	Plaintiff Network System Technologies, LLC's Sur-Reply Claim Construction Brief, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.),

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

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

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2074	U.S. Patent No. 7,737,449
2075	Single-Hop vs. Multi-Hop Networks, CADENCE, available at https://resources.pcb.cadence.com/blog/2023-single-hop-vs-multi-hop-networks
2076	Rahul Gulati et al. "SoC interconnect architecture considerations," EDN (March. 21, 2014) available at https://www.edn.com/soc-interconnect-architecture-considerations/#:~:text=SoC%20interconnect%20architecture%20considerations%201%20%20High%20throughput,objectives%2Freal%20time%20objectives%203%20%20Low%20latency%20objectives
2077	Arabinda Das "Intel's Embedded DRAM: New Era of Cache Memory" EE Times (August 7, 2014)
2078	Andrei Rădulescu et al., "An Efficient On-Chip NI Offering Guaranteed Services, Shared-Memory Abstraction, and Flexible Network Configuration," IEEE Transactions On Computer-Aided Design of Integrated Circuits and Systems, Vol. 24, No. 1 (January 2005)
2079	Archived version of A. Rădulescu et al., "An efficient on-chip network interface offering guaranteed services, shared-memory abstraction, and flexible network configuration," in the IEEE Xplore Digital Library (i.e., https://ieeexplore.ieee.org/document/1268998/), captured on June 23, 2018 by the Internet Archive's Wayback Machine, available at http://web.archive.org/web/20180623162310/https://ieeexplore.ieee.org/document/1268998/
2080	Calendar of captures by the Internet Archive's Wayback Machine of https://ieeexplore.ieee.org/document/1268998/ , available at http://web.archive.org/web/20180801000000*/https://ieeexplore.ieee.org/document/1268998/
2081	Declaration of Angelo J. Christopher
2082	Affidavit of Nathaniel E. Frank-White
2083	Declaration of Dr. Marwan Hassoun, <i>Network System Technologies, LLC v. Qualcomm Incorporated et al.</i> , Civil Action No. 1:22-cv-1331-DAE (W.D. Tex.), Dkt. 77-1 (Oct. 12, 2023)
2084	Transcript of Feb. 18, 2025 Deposition of Dr. Marwan Hassoun

Exhibit No.	Description
2085	Transcript of Feb. 25, 2025 Deposition of Dr. Nikil Dutt

I. INTRODUCTION

Pursuant to 37 C.F.R. § 42.71(d), Patent Owner respectfully requests rehearing of the Board's Final Written Decision ("Decision" or "FWD," Paper 65). As set forth herein, in finding that Petitioner met its burden for Ground 2, the Decision misapprehended or overlooked its earlier finding in Ground 1 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." As 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.

II. LEGAL STANDARD FOR REHEARING

"A party dissatisfied with a decision may file a request for rehearing" identifying "all matters the party believes the Board misapprehended or overlooked, and the place where each matter was previously addressed." 37 C.F.R. § 42.71(d).

III. REQUESTED RELIEF

Patent Owner respectfully requests rehearing because the Decision overlooked or misapprehended arguments and evidence relating to limitation 6.d in independent claim 6. In 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. FWD, 50-51.

However, in Ground 2, the Decision overlooked its finding in Ground 1 that Rădulescu2004 does not disclose “mapping . . . according to said at least one communication service identification” and incorrectly stated that Rădulescu2004 discloses all limitation of claim 6 except the “communication service identification” in the preamble. FWD, 67. The Decision therefore overlooked or misapprehended Patent Owner's arguments showing why Petitioner's Rădulescu2004-OCP combination would not meet limitation 6.d. Indeed, the Decision did not address why it allegedly would have been obvious to modify Rădulescu2004 with OCP to perform “mapping . . . according to said at least one communication service identification” that includes either an address range or communication thread. The same reasoning applies for the other challenged claims. *See id.*, 67-71.

IV. ARGUMENT

A. The Board Correctly Found that Rădulescu2004 Does Not Disclose Limitation 6.pre.b or 6.d of Claim 6

The Decision correctly found that Petitioner failed to meet its burden to show that Rădulescu2004 anticipates claim 6 of the '052 Patent as alleged in Ground 1. FWD, 50-54. Specifically, the Board found that (1) “Petitioner does not allege that Rădulescu2004 discloses a ‘communication thread,’” and (2) “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 Radulescu2004's communication service identification itself contains an address range." *Id.*, 50. Based on these findings, the Board concluded that "Rădulescu2004 does not disclose a 'communication service identification' that comprises a communication thread or address range" as required in limitation 6.pre.b. *Id.*, 51.

After finding Petitioner did not meet its burden for Ground 1, the Board continued to discuss Petitioner's arguments "because, for Ground 2, Petitioner, in part, relies on its showing for Ground 1." FWD, 52. The Board then found 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." *Id.* However, a few sentences later, the Board acknowledged that because Rădulescu2004 does not disclose the claimed "communication service identification," that means "Rădulescu2004 also does not disclose mapping specifically 'according to said at least one communication service identification.'" *Id.*

Indeed, limitation 6.d of claim 6 requires "mapping the requested at least one communication service based on said specific communication properties to a connection based on a set of connection properties ***according to said at least one communication service identification.***" EX1001, 10:28-32 (emphasis added).

Based 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. FWD, 50-51. In other words, if Rădulescu2004 does not disclose limitation 6.pre.b, it necessarily does not disclose limitation 6.d.

B. The Board Should Rehear its Finding that Radulescu2004 and OCP Disclose Limitation 6.d

For Ground 2, 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 POSITA 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. Paper 38, 47-53; Paper 55, 14-15; *see also* Paper 64, 48:8-49:11, 50:21-23. After summarizing some of the parties' arguments on these issues, the Decision states:

For the reasons stated in Section III.D.3.c above, we find that *Radluescu2004 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 Radulescu2004 and would have had
a reasonable expectation of success in doing so.

FWD, 67 (emphases added).

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. FWD, 52. In other words, for Ground 2, the Decision appears to have incorrectly assumed that Rădulescu2004 discloses limitation 6.d. Indeed, the Decision does not specifically address how or why Rădulescu2004 and OCP would be combined to meet the "mapping . . . according to the said at least one communication service identification" requirement. *Id.*, 61-67.

This oversight led the Decision to overlook or misapprehend key arguments and evidence showing that, like Rădulescu2004, OPC does not disclose the claimed "mapping." By way of background, the '052 Patent is directed to a network on chip ("NoC") that connects existing IP modules that employ traditional on-chip protocols over a network that includes one or more connections with specific properties. Paper 38, 3-8; EX1001, 2:43-45, 2:55-3:2; EX2070, ¶¶ 81-83. The claimed "mapping is relevant for communication protocols" in the existing IP modules, such as DTL, AXI, and OCP, "which do not include the notion of connection, but are implemented

with an interconnect supporting connections.” EX1001, 8:47-51; EX2070, ¶91. In other words, “mapping” is advantageous because “it enables the use of connections for protocols without the notion of connection.” EX1001, 8:51-56; EX2070, ¶91, 187.

In an attempt to address Rădulescu2004's failure to disclose “mapping . . . according to said at least one communication service identification” as claimed, the Petition argued that Rădulescu2004 and OCP both describe the use of “connections,” and that OCP describes mapping using either an address range or a communication thread. *See* Paper 3, 42. The Decision overlooked or misapprehended evidence that that OCP cannot disclose the claimed “mapping” because what OCP refers to as a “connection” is at a different layer of the OSI-model than the connections discussed in Rădulescu2004. Paper 55, 14-15; EX2070, ¶187; EX2084, 289:12-17. This is because OCP uses *bus-based* connections while Rădulescu2004 uses *packet-based* connections. *Id.* Indeed, the '052 Patent itself explains that OCP is an example of a communication protocol that, unlike the NoC in Rădulescu2004, “do[es] not include the notion of connection.” EX1001, 8:47-58; EX2070, ¶187. This means that OCP does not and cannot disclose the claimed “mapping” in the '052 Patent.

The Decision also overlooked or misapprehended inconsistencies in Petitioner's arguments regarding OCP's alleged disclosure of “mapping.” On one hand, Petitioner and its expert argued that OCP's interfaces perform “mapping,” yet

on the other hand they expressly disavowed any reliance on OCP's interfaces in the proposed combination with Rădulescu2004. Paper 55, 14-15; EX1030, ¶47 (explaining that the "combination *does not call for the incorporation of OCP's interfaces* in Radulescu2004's network") (emphasis added); EX1006, 38-39, 46-47; EX2070, ¶146. Petitioner provided no evidence how Rădulescu2004's interface would perform "mapping" according to OCP signal, or why a POSITA would be motivated to perform mapping using those signals. Paper 55, 14-15. There is no teaching or suggestion in either Rădulescu2004 or OCP to use an address range or communication thread for purposes of the claimed "mapping."

The Decision further overlooked or misapprehended Patent Owner's argument that to the extent Rădulescu2004 performs any "mapping" to a connection at all, it is performed according to a connid signal rather than a communication service identification. Paper 55, 11, 14; EX2084, 101:7-9; EX1003, ¶122; EX1030, ¶30. Rădulescu2004 discloses that "[a] port can have multiple connections to allow differentiated traffic classes, in which case there are also *connid signals to select on which connection* a message is supplied or consumed." EX1005, 3. This is important because there is no teaching or suggestion in Rădulescu2004 of using anything other than a connid—which is not the claimed communication service identification—for anything resembling "mapping" and OCP does not cure this deficiency.

To the extent the Decision simply adopted Petitioner's arguments regarding all of these issues and rejected Patent Owner's arguments and evidence, the Decision does not explain why it did so. *See* FWD, 59-68. This approach does not comport with the Administrative Procedure Act, frustrates judicial review of the Decision, and warrants rehearing. *See, e.g., In re Nuvasive, Inc.*, 842 F.3d 1376, 1383 (Fed. Cir. 2016) (holding that "it is not adequate to summarize and reject arguments without explaining why the PTAB accepts the prevailing argument"); *Pers. Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 992 (Fed. Cir. 2017) (holding that "in order to allow effective judicial review . . . the agency is obligated to provide an administrative record showing the evidence on which the findings are based, accompanied by the agency's reasoning in reaching its conclusions") (internal quotation marks omitted).

V. CONCLUSION

For the reasons set forth herein, Patent Owner respectfully requests rehearing of the Decision and a finding that the challenged claims of the '052 Patent are patentable.

U.S. Patent No. 7,594,052
IPR2024-00343

Patent Owner's Request for Rehearing

Respectfully submitted,

Dated: July 14, 2025

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing **Patent Owner's Request for Rehearing** was served on July 14, 2025, via email:

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