UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEALS BOARD

DAIMLER NORTH AMERICA CORPORATION, MERCEDES-BENZ USA, LLC, and MERCEDES-BENZ U.S. INTERNATIONAL, INC.,
Petitioner

v.

STRAGENT, LLC,
Patent Owner

Case No.: IPR2017-01503
Patent No. 8,566,843 B2

PETITIONER'S NOTICE OF APPEAL

Notice is hereby given, pursuant to 35 U.S.C. §§ 141, 142, and 319; 37 C.F.R. §§ 90.2, 90.3, and 104.2; Rule 4(a)(3) of the Federal Rules of Appellate Procedure; and Rule 15 of the Federal Circuit Rules, that Patent Owner Daimler North America Corporation, Mercedes-Benz USA, LLC, and Mercedes-Benz U.S. International, Inc. (collectively, "Daimler") hereby appeals to the United States Court of Appeals for the Federal Circuit from the Final Written Decision entered on December 6, 2018, (Paper No. 25) (the "Final Written Decision") and from all underlying findings, orders, decisions, determinations, rulings, and opinions adverse to Petitioner.

Pursuant to 37 C.F.R. § 90.2(a)(3)(ii), Petitioner indicates that the issues on appeal may include, but are not limited to:

1. whether the Board erred in finding claim 38 of the '843 patent patentable under 35 U.S.C. § 103 over *Posadas*, *Stewart*, and *Wense*, including the Board's determination that Petitioner did not meet its burden to show unpatentability by a preponderance of evidence, and any finding or determination supporting or related to this issue.

And, as stated above, Petitioner reserves the right to challenge any finding or determination supporting or relating to the issue listed above, as well as any other issues decided adversely to Petitioner in the Final Written Decision, and all

underlying findings, order, decisions, determinations, rulings, and opinions adverse to Petitioner in the *inter partes* review.

Pursuant to 37 C.F.R. § 90.2(a), Petitioner is (1) filing a copy of this Notice of Appeal with the Director, (2) electronically filing a copy of this Notice with the Federal Circuit, along with the requisite filing fee, and (3) filing this Notice with the Board.

Dated: February 4, 2019

/James M. Glass/

James M. Glass (Reg. No. 46,729)
Attorney Lead Counsel

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Attorney for Petitioner – Daimler North America Corporation et al.

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing **PETITIONER'S NOTICE OF APPEAL** was served on February 4, 2019 via email directed to counsel of record for the Petitioner at the following:

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Paper 25
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DAIMLER NORTH AMERICA CORPORATION, MERCEDES-BENZ USA, LLC, and MERCEDES-BENZ U.S. INTERNATIONAL, INC.,
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v.

STRAGENT, LLC,
Patent Owner.

Case IPR2017-01503
Patent 8,566,843 B2

Before LYNNE E. PETTIGREW, PATRICK M. BOUCHER, and CARL L. SILVERMAN, *Administrative Patent Judges*.

PETTIGREW, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

In response to a Petition (Paper 2, "Pet.") filed by Daimler North America Corporation, Mercedes-Benz USA, LLC, and Mercedes-Benz U.S. International, Inc. (collectively, "Petitioner"), we instituted an *inter partes* review of claims 2–46 and 52–59 of U.S. Patent No. 8,566,843 B2 (Ex. 1001, "the '843 patent"). Paper 8 ("Dec."). During the trial, Stragent, LLC ("Patent Owner") filed a Response (Paper 11, "PO Resp.") to which Petitioner filed a Reply (Paper 19, "Pet. Reply"). An oral hearing was held on September 11, 2018, and a copy of the transcript was entered into the record. Paper 24 ("Tr.").[1]

We have jurisdiction under 35 U.S.C. § 6. This Decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of the claims on which we instituted trial. Based on the record before us, Petitioner shows by a preponderance of the evidence that claims 2–37, 39–46, and 52–59 are unpatentable, but does not show by a preponderance of the evidence that claim 38 is unpatentable.

I. BACKGROUND

A. The '843 Patent

The '843 patent describes systems and methods "for sharing information in a distributed system." Ex. 1001, 1:29–30. Such systems and methods are illustrated for system architectures such as "may be situated in automotive electronics or industrial control and monitoring systems." *Id.* at 3:11–13. An example is provided in Figure 1 of the '843 patent, which is reproduced below.

[1] The hearing was a consolidated hearing for IPR2017-01502, IPR2017-01503, and IPR2017-01504.

FIGURE 1

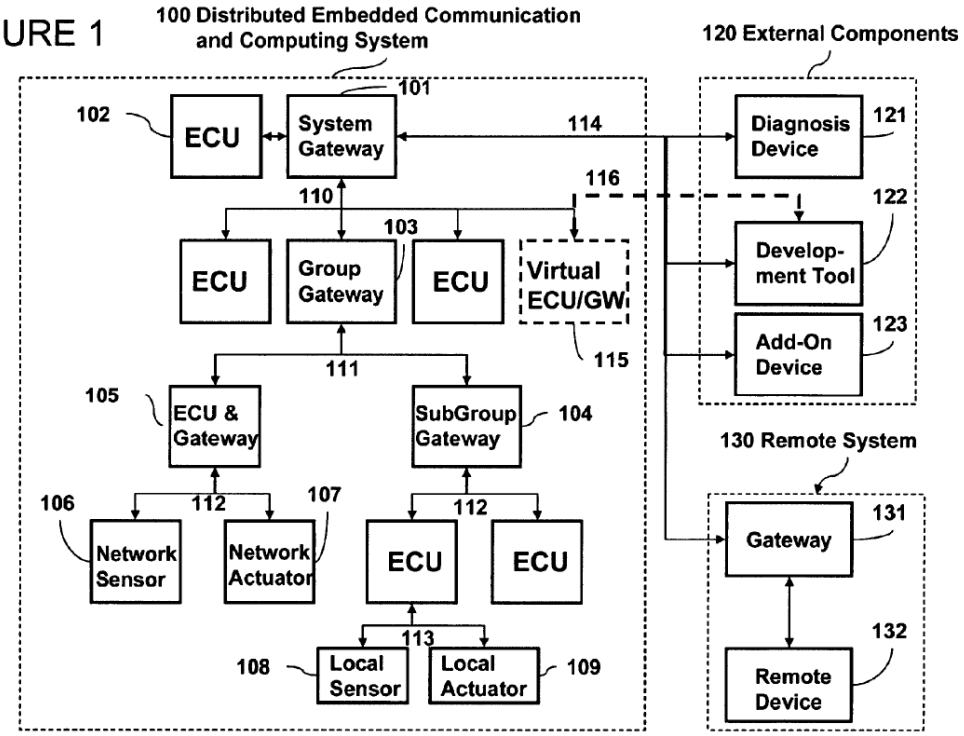

Figure 1 generally depicts elements of a distributed embedded communication and computing system. *Id.* at 3:9–11.

In an automotive environment, various electronic control units ("ECUs") control such applications as engine control, brake control, or diagnostics through connections to various sensors and actuators organized into separate subnetworks. *Id.* at 3:13–18. Such applications are themselves grouped into backbone system functions, such as "body control, power train, and chassis." *Id.* at 3:19–21. With a hierarchical organization that includes gateways 101, 103, 104, 105, messages are relayed up and down through the system layers. *Id.* at 3:24–26. Each layer may contain multiple ECUs connected through wired serial multiplexing bus systems, with the '843 patent noting several examples that include Controller Area Network ("CAN"), Local Interconnect Network ("LIN"), and Flexray. *Id.* at 3:26–33.

At the highest level in the hierarchy, "the system level," system gateway 101 is connected via various buses to other system-level ECUs, to subsequent gateways 103, and to external components 120. *Id.* at 3:60–67. In addition, system gateway 101 may be connected to external gateway 131 to link the system to remote device 132. *Id.* at 4:1–6. "Subsequent to the system level may be several layers of groups and subgroups that are link[ed] to the higher levels via gateways (101, 103, 104, 105)." *Id.* at 4:7–9.

In operation, ECU 102 receives "real-time" input variables from local sensors 108 or from networked sensors 106, respectively via signal lines 113 or multiplexing bus system 112. *Id.* at 3:39–42. "[R]eal-time may include any response time that may be measured in milli- or microseconds, and/or is less than 1 second." *Id.* at 3:36–38. ECU 102 processes the input variables and generates output variables that may be shared with other ECUs 102. *Id.* at 3:46–51.

Two relevant modes of sharing are described. First, ECUs 102 "typically share information with devices that are connected on the same physical multiplexing system. This method of information sharing is called horizontal information sharing in a hierarchical system." *Id.* at 3:51–55.

Second, a bulletin board may be used so that "the information is shared, in real-time, among a plurality of heterogeneous processes." *Id.* at 1:31–33. According to the '843 patent, "heterogeneous networks may refer to any different communication networks with at least one aspect that is different." *Id.* at 7:27–29. Figure 7 of the '843 patent, reproduced below, illustrates a logical architecture between three heterogeneous network controllers using such a bulletin board. *Id.* at 6:33–35.

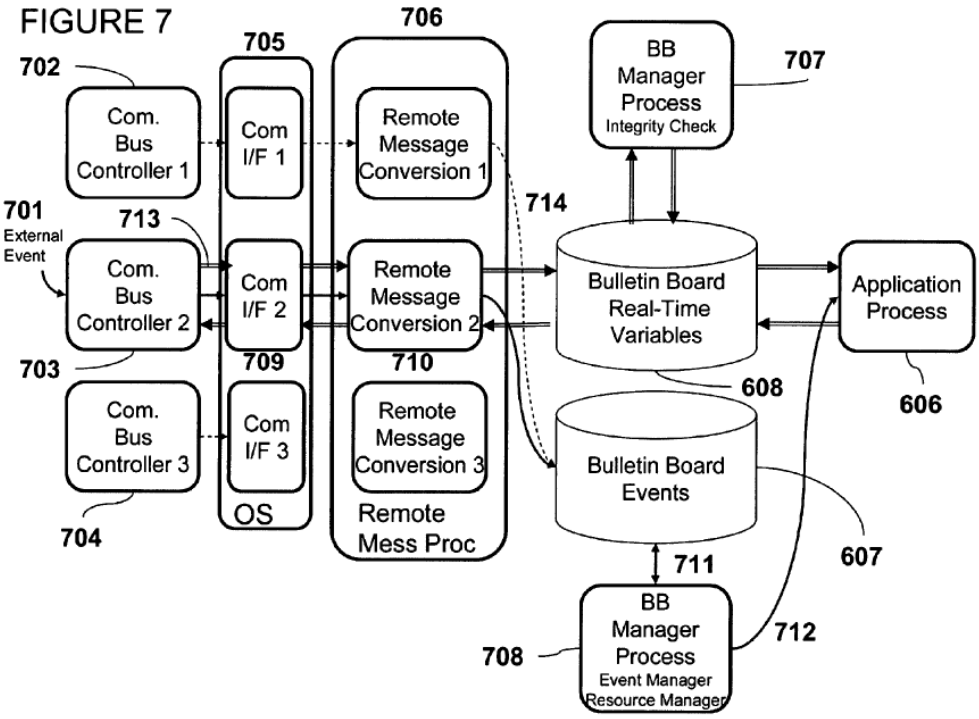

Figure 7 illustrates a system architecture in which a bulletin board acts as a shared memory interacting with multiple communication buses, with data received from one communication bus stored on the bulletin board and shared as a new message with other network types. *Id.* at 7:4–37.

The illustrated architecture includes four principal components: (1) network controllers 702, 703, and 704 (first column) for each of multiple heterogeneous networks; (2) associated operating system interfaces 705 for each of the heterogeneous networks (second column); (3) remote message communication processes 706 for stripping out network-specific information (third column); and (4) the bulletin board, which may contain events 607, real-time variables 608, configuration parameters, and firmware. *Id.* at 5:3–67, 6:33–37. In operation, external event 701, such as a flag indicating that data from a sensor are available, is transmitted on a network to a communication bus controller, such as network controller 703 in Figure 7. *Id.* at 7:4–9. This causes an operating system interface (such as

communication interface 709) to notify a remote message communication process (such as remote message conversion method 710) that data are available, with notification provided in turn to application process 606. *Id.* at 7:4–17.

B. Prosecution History

The application that matured into the '843 patent is a continuation of the application that matured into U.S. Patent No. 8,209,705 B2 ("the '705 patent"), filed July 30, 2008. Ex. 1001, at [63]. The '705 patent is a continuation of U.S. Patent No. 7,802,263 B2 ("the '263 patent"), filed December 15, 2003. *Id.*

At the time of filing the application that matured into the '263 patent, independent claim 1 recited the following:

> 1. A method for sharing information in a distributed system, comprising:
>
> receiving information;
>
> storing the information on a bulletin board; and
>
> sharing, in real-time, the information among a plurality of heterogeneous processes.

Ex. 1002, 649. Although certain amendments were made to the claim during prosecution, allowance was secured only after an interview with the Examiner in which the applicants authorized the addition of several limitations: (1) "requesting a bulletin board resource of one or more bulletin boards"; (2) "determining whether the bulletin board resource is available"; (3) "in the event the bulletin board resource is not available, re-requesting the bulletin board resource until a threshold has been reached"; and (4) storing the information on the bulletin board resource "in the event the bulletin board resource is available." *Id.* at 250–52.

Independent claim 1 was filed in the same original form at the time of filing the application that matured into the '705 patent. Ex. 1003, 255. During prosecution, the applicants amended the claims to add limitations similar to those that secured allowance of the claims of the '263 patent:

> in the event the storage resource is not available, determining whether a timeout has been reached and causing a re-request in connection with the storage resource if the timeout has not been reached; [and]
>
> in the event the timeout has been reached, causing an error notification to be sent.

Id. at 84–85 (underscoring in original to identify material added by amendment). These added limitations were among those identified by the Examiner in allowing the application as not "disclose[d] or suggest[ed]" "when taken in the context of [the] claims as a whole." *Id.* at 98–99.

Independent claim 1 was again filed in the same original form at the time of filing the application that matured into the '843 patent. Ex. 1004, 220. The originally filed claims were subsequently canceled during prosecution and applicants submitted new claims that included limitations similar to those that secured allowance in the prior applications. *Id.* at 116–31. The amended claims were subsequently allowed without express Reasons for Allowance by the Examiner. *Id.* at 63–94. Newly added claim 33 issued as independent claim 1, and newly added claim 83 issued as independent claim 51. *Compare* Ex. 1001, 12:16–62, *with* Ex. 1004, 118–119, *and* Ex. 1001, 18:29–19:5, *with* Ex. 1004, 129–30.

C. Illustrative Claim

Challenged claims 2–46 depend from independent claim 1, and challenged claims 52–59 depend from independent claim 51. Claim 51,

which is illustrative of the subject matter of the challenged claims, is reproduced below, with lettering and formatting added to identify claim limitations in accordance with the scheme used by Petitioner. *See* Pet. 4–5, 10–37.

> 51. [a] An apparatus, comprising:
>
> [b] a control unit configured for:
>
> [c] identifying information associated with a message received utilizing a first network protocol associated with a first network;
>
> [d] issuing a storage resource request in connection with a storage resource and determining whether the storage resource is available;
>
> [e] determining whether a threshold has been reached in association with the storage resource request;
>
> [f] in the event the storage resource is not available and the threshold associated with the storage resource request has not been reached, issuing another storage resource request in connection with the storage resource;
>
> [g] in the event the storage resource is not available and the threshold associated with the storage resource request has been reached, sending a notification; and
>
> [h] in the event the storage resource is available, storing the information utilizing the storage resource;
>
> [i] wherein the apparatus is operable such that the information is capable of being shared in real-time utilizing a second network protocol associated with a second network, and the control unit includes:
>
> [j] a first interface for interfacing with the first network,
>
> [k] the first interface including a first interface-related first component for receiving first data units and a first interface-related second component, the control unit being operable such that the first data units are processed after which processed first data units are provided,
>
> [l] where the first network is at least one of a Controller Area Network type, a Flexray type, or a Local Interconnect Network type; and

> [m] a second interface for interfacing with the second network,
>
> [n] the second interface including a second interface-related first component for receiving second data units and a second interface-related second component, the control unit being operable such that the second data units are processed after which processed second data units are provided,
>
> [o] where the second network is at least one of the Controller Area Network type, the Flexray network type, or the Local Interconnect Network type.

Ex. 1001, 18:29–19:5.

D. Evidence

Petitioner relies upon the following references (Pet. 8–10):

J.L. Posadas et al., *Communications Structure for Sensor Fusion in Distributed Real Time Systems*, ALGORITHMS AND ARCHITECTURES FOR REAL-TIME CONTROL 2000, PROC. FROM THE 6TH IFAC WORKSHOP, May 15–17, 2000, at 151 (Ex. 1007, "Posadas");

David B. Stewart et al., Integration of Real-Time Software Modules for *Reconfigurable Sensor-Based Control Systems*, 1 PROC. OF THE 1992 IEEE/RSJ INT'L CONF. ON INTELLIGENT ROBOTS AND SYSTEMS 325 (1992) (Ex. 1008, "Stewart");

H.-C. von der Wense & A.J. Pohlmeyer, Building Automotive LIN Applications, Advanced Microsystems for Automotive Applications 2001, at 279 (Ex. 1009, "Wense");

Zhao, U.S. Patent Publ'n No. US 2002/0124007 A1, published Sept. 5, 2002 (Ex. 1039, "Zhao"); and

Upender, U.S. Patent No. 5,854,454, issued Dec. 29, 1998 (Ex. 1038, "Upender").

In addition, Petitioner provides Declarations by Philip Koopman, PhD. Exs. 1005, 1042. No cross-examination testimony of Dr. Koopman was filed in the proceeding.

Patent Owner provides a Declaration by Jeffrey A. Miller, PhD. Ex. 2001. Dr. Miller was cross-examined, and a transcript of his deposition was entered into the record. Ex. 1043. In addition, a transcript of Dr. Miller's deposition in Case IPR2017-00457 was entered into the record in this proceeding. Ex. 1044.

E. Asserted Grounds of Unpatentability

Petitioner contends that claims 2–46 and 52–59 of the '843 patent are unpatentable based on the following specific grounds (Pet. 8):

References	Basis	Challenged Claims
Posadas, Stewart, and Wense	35 U.S.C. § 103(a)	2–29, 31–46, and 52–58
Posadas, Stewart, Wense, and Zhao	35 U.S.C. § 103(a)	30 and 59
Posadas, Stewart, Wense, and Upender	35 U.S.C. § 103(a)	52 and 53

F. Real Parties-in-Interest

Petitioner identifies Daimler AG, Daimler North America Corporation, Mercedes-Benz USA, LLC, and Mercedes-Benz U.S. International, Inc. as real parties-in-interest in this proceeding. Pet. 83. Patent Owner identifies only itself as a real party-in-interest. Paper 5, 1.

G. Related Proceedings

The parties identify the following district court proceedings as involving the '843 patent: (1) *Stragent, LLC v. Mercedes-Benz USA, LLC*,

No. 6:16-cv-00447 (E.D. Tex.); (2) *Stragent, LLC v. BMW of North America, LLC*, No. 6:16-cv-00446 (E.D. Tex.); and (3) *Stragent, LLC v. Volvo Cars of North America, LLC*, No. 6:16-cv-00448 (E.D. Tex.). Pet. 85; Paper 4, 1–2.

The following *inter partes* review proceedings also involve the '843 patent: IPR2017-00457, IPR2017-00677, IPR2017-01504, IPR2017-01519, and IPR2017-01520. The following *inter partes* review proceedings involve the related '705 patent: IPR2017-00458, IPR2017-00676, IPR2017-01502, IPR2017-01521, and IPR2017-01522.

II. DISCUSSION

A. Claim Construction

The Board interprets claims of an unexpired patent using the broadest reasonable construction in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b) (2016); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard).[2] Consistent with the broadest reasonable construction, claim terms are presumed to have their ordinary and customary meaning as understood by a person of ordinary skill in the art in the context

[2] The Office recently promulgated changes to the claim-construction standard applied in *inter partes* review proceedings. *Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board*, 83 Fed. Reg. 51,340 (Oct. 11, 2018). Because the Petition was filed before November 13, 2018, the effective date of the rule change, those changes do not apply to this proceeding. *Id.* at 51,345 ("The Office will continue to apply the BRI standard for construing unexpired patent claims . . . in AIA proceedings where a petition was filed before the effective date of the rule.").

of the entire patent disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). An inventor may provide a meaning for a term that is different from its ordinary meaning by defining the term in the specification with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

In this section we address the claim terms for which the parties expressly propose constructions. To the extent necessary, we consider the meaning of other claim language in the context of our unpatentability analysis.

1. "real-time"

Independent claim 51 recites "the information is capable of being shared in real-time," and independent claim 1 similarly recites "in real-time, sharing the information." Ex. 1001, 12:33, 18:49–50. Both Petitioner and Patent Owner argue that the written description of the '843 patent expressly defines "real-time": "In the context of the present description, real-time may include any response time that may be measured in milli- or microseconds, and/or is less than one second." Pet. 5–6; PO Resp. 15; Ex. 1001, 3:35–38.

We construe "real-time" as including responses that occur in less than one second. The first part of the quotation above ("may be measured in milli- or microseconds") is not limiting because *any* response time, no matter how large or small, may be *measured* in milli- or microseconds.

2. Information Sharing

Independent claim 51 recites "the information is capable of being shared in real-time utilizing a second network protocol associated with a second network." Ex. 1001, 18:49–52. Independent claim 1 similarly recites "in real-time, sharing the information utilizing at least one message

format corresponding to a second network protocol associated with a second network." *Id.* at 12:33–35. Patent Owner contends that "the words '*the* information' clearly refer to information previously identified in the claims." PO Resp. 14. In claim 51, Patent Owner asserts that the previously identified "information" is "the 'information associated with a message received utilizing a first network protocol associated with a first network' (limitation 51c) which was caused to be stored utilizing the storage resource (limitation 51h) – i.e., it is information whose storage was completed to the bulletin board or the storage area." *Id.* Patent Owner thus contends that information sharing, as recited in the independent claims, requires completion of storage to the recited storage resource. Patent Owner also cites a general-dictionary definition of "share" as "to partake of, use, experience, occupy, or enjoy with others; to have in common." *Id.* (quoting Ex. 2003).

We are not persuaded by Patent Owner's contention. Claim 51 first recites "information" as part of "a control unit configured for: identifying information associated with a message received utilizing a first network protocol associated with a first network." Ex. 1001, 30–33. The claimed control unit also must be configured to perform potentially different actions depending on the satisfaction of different conditions. For example, it must be configured for "determining whether [a] storage resource is available" and "in the event the storage resource is available, storing the information utilizing the storage resource." *Id.* at 18:35–36, 18:47–48. But the control unit also must be configured for "determining whether a threshold has been reached" and "in the event the storage resource is not available and the threshold has been reached, sending a notification." *Id.* at 18:37, 18:44–46.

Thus, the plain language of the claim does not require that "the information" be stored using the "storage resource" under all conditions.

The plain language of the claim *does*, though, always require the recited apparatus to be "operable such that the information is capable of being shared in real-time utilizing a second network protocol associated with a second network." *Id.* at 18:49–52. Nothing in this limitation requires "the information" to have been stored using the storage resource. Moreover, the '843 patent describes an embodiment in which information is shared without using a shared storage resource. *Id.* at 8:51–59, 7:38–49.

At the oral hearing, Patent Owner argued that "the information that is shared is the information that is stored because that is the last antecedent." Tr. 40:21–22. Patent Owner, however, is unable to identify sufficient legal basis for this "last antecedent" theory. *Id.* at 40:17–18 ("I am not aware of any Federal Circuit or any other governing law on this . . . .").

In addition, we note that Patent Owner has submitted a definition of "share" drawn from a technical dictionary into the record of this proceeding. Ex. 2004.[3] We find the technical dictionary provided by Patent Owner to be more probative than the general-purpose dictionary relied on by Patent Owner.

[3] We note that, even if Patent Owner had not entered Exhibit 2004 into this proceeding, judges are free to rely on extrinsic dictionary definitions when construing claim terms, so long as the dictionary definition does not contradict any definition found in or ascertained by a reading of the patent documents. *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1584 n.6 (Fed. Cir. 1996); *see Phillips v. AWH Corp.*, 415 F.3d 1303, 1322–23 (Fed. Cir. 2005) (en banc).

The language of the general-purpose dictionary quoted by Patent Owner—"to partake of, use, experience, occupy, or enjoy with others; to have in common"—does not appear to contemplate the sharing of "information," which the '843 patent describes as "includ[ing] data, a signal, and/or anything else capable of being stored and shared." *See* Ex. 2003 (general definition of "share"); Ex. 1001, 3:56–59. Instead, the technical definition of "[t]o make files, directories, or folders accessible to other users over a network" is more relevant because it expressly contemplates the same context as the '843 patent, i.e., sharing over a network. Ex. 2004 (technical definition of "share").

Thus, the plain language of the claim, intrinsic evidence in the form of the written description, and extrinsic evidence in the form of a technical-dictionary definition all support a construction of information sharing that requires making the information accessible, without requiring storage of the information. We accordingly construe the various recitations of information sharing in the claims in accordance with such requirements.

3. "the second network"

Limitations 51m, 51n, and 51o recite:

> [m] a second interface for interfacing with the second network,
>
> [n] the second interface including a second interface-related first component for receiving second data units and a second interface-related second component, the control unit being operable such that the second data units are processed after which processed second data units are provided,
>
> [o] where the second network is at least one of the Controller Area Network type, the Flexray network type, or the Local Interconnect Network type.

Ex. 1001, 18:63–19:5 (formatting modified). Claim 1 recites similar limitations. Patent Owner contends that "the second network" in these limitations "refers to the second network described in the antecedent limitations, which is the network referenced in limitation 51i as the second network utilizing a second different protocol which is the recipient of the 'shared' information connected to the storage resource." PO Resp. 16.

Although we agree with Patent Owner that "the second network" refers back to "a second network" in limitation 51i, we disagree with other aspects of Patent Owner's proposed construction. First, unlike some of the dependent claims (e.g., claim 56), claim 51 does not require the second network protocol to be different from the first network protocol. *Compare* Ex. 1001, 18:49–19:5 (limitations 51i–51o), *with id.* at 19:19–21 (claim 56 reciting "wherein the apparatus is operable such that the second network protocol is different than the first network protocol"). Second, nothing in the claim language requires the second network to be the "recipient" of information or to be connected to a storage resource. We agree with Petitioner that the additional limitations proposed by Patent Owner should not be read into the claim and that "the second network" requires no further construction. *See* Pet. Reply 5.

B. Legal Principles

A claim is unpatentable for obviousness under 35 U.S.C. § 103(a) if the differences between the claimed subject matter 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." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of

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 skill in the art; and (4) when in evidence, objective indicia of non-obviousness (i.e., secondary considerations).[4] *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). Additionally, the obviousness inquiry typically requires an analysis of "whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue." *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2016) (requiring "articulated reasoning with some rational underpinning to support the legal conclusion of obviousness")).

To prevail on its challenges, Petitioner must demonstrate by a preponderance of the evidence that the claims are unpatentable. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). "In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable." *Harmonic Inc. v. Avid Tech., Inc.* 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")). This burden never shifts to Patent Owner. *See Dynamic Drinkware, LLC. v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–27 (Fed. Cir. 2008)) (discussing the burden of proof in *inter partes* review). Furthermore, Petitioner does not satisfy its burden of proving obviousness by employing "mere conclusory statements," but "must instead articulate specific reasoning, based on

[4] The parties do not address secondary considerations, which therefore do not constitute part of our analysis.

evidence of record, to support the legal conclusion of obviousness. *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016).

C. Level of Ordinary Skill in the Art

Petitioner contends that a person of ordinary skill in the art "would have at least an undergraduate degree in Computer Engineering, Computer Science, or equivalent degree, and at least two years relevant experience in industry." Pet. 5. Dr. Koopman's testimony supports Petitioner's proposal. Ex. 1005 ¶ 46. Patent Owner contends that a person of ordinary skill in the art

> would have had at least the qualifications of or equivalent to either a master's degree in electrical engineering, computer science, or computer engineering with course work or research in embedded networking technologies or an undergraduate degree in electrical engineering, computer science, or computer engineering with at least two years of relevant work experience in industry.

PO Resp. 16. Dr. Miller's testimony supports Patent Owner's proposal. Ex. 2006 ¶ 20.

The principal difference between the parties' proposals is that, as an alternative to an undergraduate degree and two years of relevant work experience, Patent Owner's proposal allows for a master's degree with course work or research in embedded networking technologies. Based on our review of the '843 patent and the prior art of record, we find that a master's degree with relevant course work or research is equivalent to a bachelor's degree with two years of relevant work experience. We therefore adopt Patent Owner's expression of the level of skill in the art, which encompasses both alternative sets of qualifications.

D. Overview of Asserted References

1. Posadas

Posadas describes a real-time communications system implemented in an autonomous industrial robot referred to as YAIR (Yet Another Intelligent Robot). Ex. 1007, 8.[5] According to Petitioner, YAIR includes a number of sensors that are interconnected using two different, real-time networks. Pet. 8; *see* Ex. 1007, 8, Fig. 1. Figure 1 of Posadas (highlighting added by Petitioner) is reproduced below:

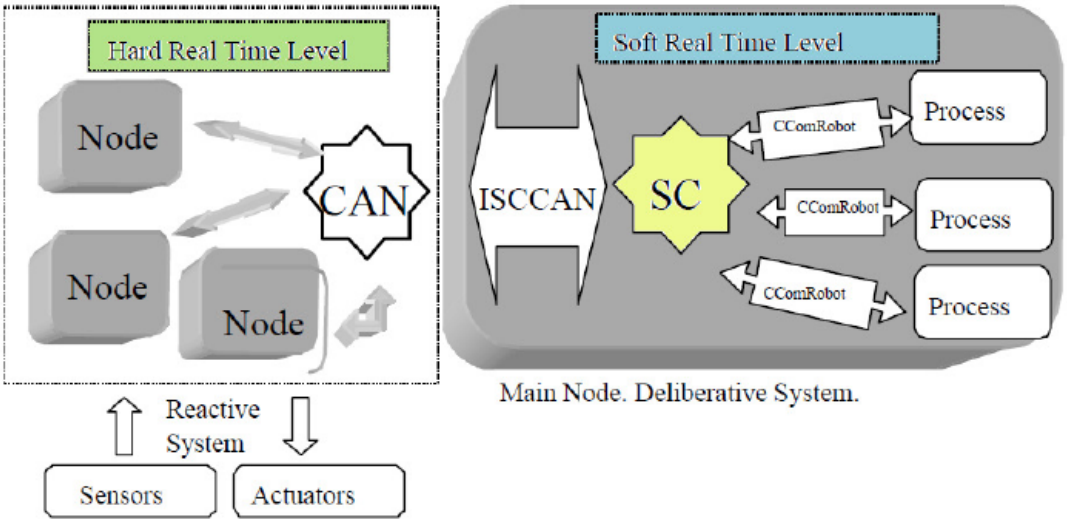

Fig. 1: Communication System Structure

Pet. 9 (citing Ex. 1007, Fig. 1). Figure 1 of Posadas illustrates a communication system structure that includes a "reactive system," described as "Hard Real Time," which uses distributed CAN objects on a CAN bus, in

[5] For the Posadas, Stewart, and Wense references, we cite to the exhibit page numbers added by Petitioner rather than to the native page numbers of the underlying references.

communication with a "deliberative system," described as "Soft Real Time." Ex. 1007, 8, Fig. 1. Posadas also discloses a "distributed blackboard structure" for data storage, referred to as "SC," that enables the main robot controller to "communicate through different channels: CAN, [E]thernet, DDE, RS232, and so on." *Id.* at 8. Figure 4 of Posadas is reproduced below:

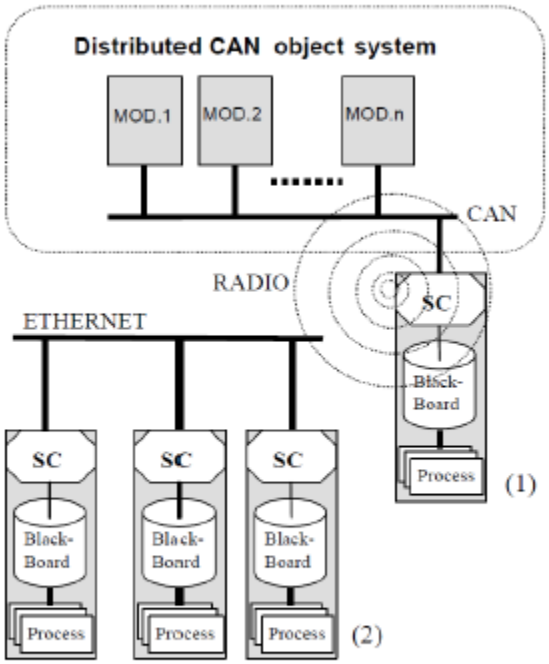

Fig. 4: Distributed blackboard structure.

Id. at 10–11, Fig. 4. Figure 4 illustrates Posadas's distributed blackboard structure (SC), which can be accessed by the hard real time network, using a CAN bus and distributed CAN object system, and processes in the soft real time (i.e., deliberative) network via, for example, an Ethernet. *Id.*

2. Stewart

Stewart discloses a framework for integrating real-time software control modules that comprise a reconfigurable multi-sensor based system.

Ex. 1008, 6. The framework is based on a global database of state information through which real-time software modules exchange information. *Id.* Stewart describes a "spin-lock" synchronization method in the context of its global state variable table mechanism that uses a "test-and-set (TAS)" operation to determine memory availability. *Id.* at 11.

3. Wense

Wense describes the use of different networks in automobiles, including CAN, LIN, and Flexray. Ex. 1009, 11. In particular, Wense describes the use of CAN and LIN in a single automotive network. *Id.* at 13, Fig. 3.

4. Upender

Upender discloses a control system that "utilizes standard Control Area Network (CAN) hardware and message protocols." Ex. 1038, at [57]. Specifically, Upender discloses a "CAN protocol which will support hierarchical communications between many nodes [and] between nodes capable of transmitting same message types." *Id.* at 2:17–20. Upender uses "standard CAN hardware" that employs a "standard CAN message." *Id.* at 2:34–37, 2:45–50, Fig. 1.

5. Zhao

Zhao describes a network server for establishing communication between devices and a network. Ex. 1039 ¶ 1. Although Zhao's exemplary system has two network servers communicating with two networks, Zhao explains that the system is not so limited and may include "any number of" network servers and networks. *Id.* ¶ 26. Networks in Zhao can use a variety of protocols, including RS-232, RS-485, MODEM, IEEE 1394, USB, CANBus, CEBus, and Bluetooth. *Id.* ¶ 28. A shared database environment

allows intelligent devices to exchange data with other intelligent devices through a network server. *Id.* ¶ 62.

E. Asserted Obviousness of Claims 2–46 and 52–59

Petitioner contends that claims 2–29, 31–46, and 52–58 of the '843 patent are unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of Posadas, Stewart, and Wense; claims 30 and 59 are unpatentable as obvious over the combination of Posadas, Stewart, Wense, and Zhao; and claims 52 and 53 are unpatentable as obvious over the combination of Posadas, Stewart, Wense, and Upender. Pet. 10–83. In IPR2017-00457 ("the -457 IPR"), the Board determined Petitioner had demonstrated by a preponderance of the evidence that independent claims 1 and 51 of the '843 patent are unpatentable under 35 U.S.C. § 103(a) over Posadas, Stewart, and Wense. *Daimler AG v. Stragent, LLC*, Case IPR2017-00457, slip op. at 13–30 (PTAB June 13, 2018) (Paper 34) ("-457 Decision"). Claims 2–46 depend directly or indirectly from independent claim 1, and claims 52–59 depend directly or indirectly from independent claim 51. Accordingly, before addressing the challenged dependent claims, the Petition in this proceeding presents a detailed analysis of why claim 51 would have been obvious over the combination of references and then analyzes claim 1 to the extent it differs from claim 51. Pet. 10–37, 44–46. Likewise, many of Patent Owner's responsive arguments are directed to claim 51 and are equally applicable to claim 1. PO Resp. 22–34, 36–37. For these reasons, our analysis begins with independent claim 51 followed by a brief discussion of independent claim 1. We then determine whether Petitioner shows by a preponderance of the evidence that the challenged

dependent claims would have been obvious over the asserted combinations of references.

1. Claim 51

Petitioner relies primarily on Posadas for teaching the limitations relating to first and second networks and associated interfaces (i.e., limitations 51a–51c and 51i–51o), with additional support from Wense regarding different types of networks. Pet. 10–12, 18–37. Specifically, Petitioner contends that Posadas discloses two different networks—CAN and Ethernet—and relies on Wense for teaching that the second network can be FlexRay or LIN. For the remaining limitations of claim 51 (i.e., limitations 51d–51h), referred to by Petitioner as the "memory-related limitations," Petitioner relies on a combination of Posadas and Stewart. *Id.* at 12–18. We address Petitioner's contentions and, where applicable, Patent Owner's responsive arguments for each limitation.

Limitations 51a (preamble) and 51b

The preamble and first limitation require an "apparatus" that comprises a "control unit." Ex. 1001, 18:29–30. Petitioner contends that Posadas describes a communications architecture used in the YAIR robot, 10–11 (citing Ex. 1007, Abstract). We agree with the contention, which Patent Owner does not address in its Response.

Limitation 51c

Limitation 51c recites "identifying information associated with a message received utilizing a first network protocol associated with a first network." Ex. 1001, 18:31–33. Petitioner identifies Posadas's CAN system distributed over a CAN bus as the "first network" and the CAN protocol as the "first network protocol." Pet. 11 (citing Ex. 1007, 9–10, Figs. 3, 4;

Ex. 1005 ¶ 118). Petitioner also asserts that in Posadas, the ISCCAN gateway receives a CAN frame (i.e., message), and information in the CAN message must be identified to enable the "selective processing" described in Posadas. Pet. 12 (citing Ex. 1007, 11); *see* Ex. 1005 ¶ 117. Petitioner's analysis of this limitation, supported by the testimony of Dr. Koopman, and not disputed by Patent Owner, sufficiently shows that Posadas discloses this limitation.

Limitation 51d

Limitation 51d recites "issuing a storage resource request in connection with a storage resource and determining whether the storage resource is available." Ex. 1001, 18:34–36. For this limitation, Petitioner first identifies Posadas's shared memory, including the blackboard system, as a "storage resource." Pet. 12–13 (citing Ex. 1007, 10; Ex. 1005 ¶ 120). Next, relying on the testimony of Dr. Koopman, Petitioner contends that "[d]etermining whether memory is available before writing to it is a basic, fundamental and, of course, well-known step in storing information" and would have been part of a typical shared-memory computer system. *Id.* at 13 (citing Ex. 1005 ¶ 121). Petitioner also relies on Stewart, which discloses a framework for integrating real-time software control modules in a multi-sensor based system and, like Posadas and the '843 patent, discloses the use of a real-time embedded system that is used in a distributed environment and uses a shared, global memory. *Id.* (citing Ex. 1008, 6–7, 9). Stewart expressly discloses a "spin-lock" that uses a "test-and-set (TAS)" operation to determine memory availability. *Id.* (citing Ex. 1008, 11). The TAS algorithm determines whether memory is available before writing to it by

reading the current lock value and then writes a "1" to the lock table to lock the memory for concurrent writes from other processes. Ex. 1008, 11.

Petitioner contends that a person of ordinary skill in the art would have combined the teachings of Stewart with Posadas for a variety of reasons. Pet. 14–17. For example, Petitioner asserts that both Posadas and Stewart "relate to real-time distributed computer control systems with an emphasis on robotics." *Id.* at 14 (citing Ex. 1007, 8; Ex. 1008, Abstract, 8, 11–12). Further, both "use a shared memory architecture to exchange information between the hybrid control modules that make up a real-time distributed system, such as that of a robot." *Id.* Relying on the testimony of Dr. Koopman, Petitioner also contends that "[d]etermining whether memory is available before writing to it is a basic, fundamental operation that was well-known to those of skill in the art" and that the memory-related limitations recited in claim 51 and taught by Stewart "amount to no more than simple, preexisting tools that [one of ordinary skill] designing a computer system that used shared memory would have been very familiar with." *Id.* at 14–15 (citing Ex. 1005 ¶ 126). In addition, Petitioner contends that the combination of Posadas and Stewart would have been predictable because, for example, spin-lock mechanisms like Stewart's were well known in the art and a person of ordinary skill would have known the benefits of using such memory-arbitration techniques in the shared memory architecture of Posadas. *Id.* at 15 (citing Ex. 1005 ¶ 127); *see also* Ex. 1005 ¶¶ 95–102 (Dr. Koopman explaining that retry and timeout mechanisms for arbitrating memory access, including the spin-lock technique with a "test and set" approach described in Stewart, were well known at the time of the '843 patent).

Patent Owner contends that Petitioner's argument for combining Stewart with Posadas is flawed because "Posadas discloses a particular distributed blackboard storage system that includes an undisclosed storage medium utilizing an unknown process." PO Resp. 24. With reference to Figure 4 of Posadas, Patent Owner further argues that "rather than there being a shared memory, all the data is stored in particular silos, with each silo having its own processor performing undisclosed operations." *Id.* at 25. According to Patent Owner, "[t]here is too much possibility that the silos shown in Posadas – combining both a blackboard and a processor—present unique issues to assume anything about whether some unrelated technology could be combined with such a unique Posadas environment." *Id.* at 25–26 (citing Ex. 2006 ¶ 52).

We are not persuaded by Patent Owner's contentions, or Dr. Miller's related declaration testimony, that Posadas's storage structure is so "unique" that a person of ordinary skill in the art would not have applied Stewart's techniques for determining memory availability. Although Patent Owner submits that Posadas does not disclose a "shared memory," Figure 1 of Posadas shows otherwise—the SC blackboard system is accessed by the robot's deliberative processes and, via the ISCCAN gateway, the CAN network. Ex. 1007, 8, 10–11. Moreover, Petitioner and Dr. Koopman present persuasive evidence that the memory arbitration processes described in Stewart were fundamental techniques that were well known at the time of the '843 patent. *See* Ex. 1005 ¶¶ 95–102, 126–128. Having reviewed the parties' arguments and supporting evidence, we find Petitioner provides sufficient reasoning with rational underpinning for combining Stewart and Posadas as asserted in the Petition.

Limitations 51e and 51f

Limitations 51e and 51f recite "determining whether a threshold has been reached in association with the storage resource request," and "in the event the storage resource is not available and the threshold associated with the storage resource request has not been reached, issuing another storage resource request in connection with the storage resource." Ex. 1001, 18:37–43. For these limitations, Petitioner cites Stewart's "spin-lock," which uses a "test-and-set (TAS)" operation to determine memory availability. Pet. 17 (citing Ex. 1008, 11). A task trying to access the global state variable table in shared memory must continually retry accessing the table, waiting a particular amount of time (referred to as a "polling time") between retries. Ex. 1008, 11. Stewart also describes a "maximum waiting time," or "time-out period," for retries, after which the task will not perform memory storage. *Id.* Petitioner identifies this "time-out period" as the claimed "threshold." Pet. 17–18.

Patent Owner does not dispute that Stewart teaches these limitations, but again argues that a person of ordinary skill in the art would not have combined Stewart with Posadas because "Posadas discloses a particular distributed blackboard storage system." PO Resp. 26. As discussed with respect to limitation 51d, we find that Petitioner presents a sufficient rationale for combining the references. We also agree with Petitioner that Stewart teaches the recited memory-related limitations.

Limitation 51g

Limitation 51g recites "in the event the storage resource is not available and the threshold associated with the storage resource request has been reached, sending a notification." Ex. 1001, 18:44–46. For this

limitation, Petitioner cites Stewart's statement that "[w]hen using the time-out mechanism, error handlers should be installed to detect tasks that suffer successive time-out errors." Pet. 17–18 (quoting Ex. 1008, 11).

Patent Owner argues that "[t]he typical meaning of an 'error handler' is a mechanism that forestalls errors if possible, and then recovers from errors when they occur without terminating the application." PO Resp. 27–28 (citing Ex. 2006 ¶ 61). According to Patent Owner, an error handler "does not necessarily or inherently include sending a notification." *Id.* at 28. Further, Patent Owner contends that Stewart "expressly disclaims the disclosure of any particular error-handling method" because it states that the "discussion on handling these errors is beyond the scope of this paper." *Id.* (citing Ex. 1008, 11).

We are not persuaded by Patent Owner's arguments and find that the evidence of record supports Petitioner's position. First, in response to Patent Owner's argument regarding the "typical meaning" of an error handler, Petitioner asserts that, according to a well-understood meaning in the art, an error handler includes code that receives a notification when an error occurs. Pet. Reply 7 (citing Ex. 1042 ¶ 37). The cross-examination testimony of Patent Owner's declarant, Dr. Miller, generally supports Petitioner's argument rather than Patent Owner's. For example, Dr. Miller testifies on cross-examination that an error handler does not prevent errors before they occur, as Patent Owner contends, but instead handles an error after it occurs. Ex. 1044, 122:18–123:5. Dr. Miller further states that when an error occurs, "there needs to be some recognition of an error, and then something to deal with it." *Id.* at 115:18–25. Specifically, he agrees that "an error handler is generally called when an error occurs." *Id.* at 115:7–10.

In view of this evidence, we agree with Petitioner that Stewart teaches or at least suggests sending a notification to an error handler when the storage resource is not available and the threshold (i.e., Stewart's time-out period) has been reached.

Limitation 51h

Limitation 51h recites "in the event the storage resource is available, storing the information utilizing the storage resource." Ex. 1001, 18:47–48. According to Petitioner, Stewart discloses storing information in memory (i.e., Stewart's global variable table) once it is determined that the memory is available. Pet. 18 (citing Ex. 1008, 11). Patent Owner does not dispute that Stewart discloses this limitation, but again repeats its unpersuasive argument that a person of ordinary skill would not have combined Stewart with Posadas. PO Resp. 26–27.

We agree with Petitioner that the cited disclosure in Stewart teaches this limitation, and disagree with Patent Owner's contention for the reasons discussed previously.

Limitation 51i

Limitation 51i requires that the claimed apparatus be "operable such that the information is capable of being shared in real-time utilizing a second network protocol associated with a second network." Ex. 1001, 18:49–52. Petitioner contends that Posadas discloses two networks—a first network that is CAN (addressed above in connection with limitation 51c), and a second network that is "CAN, Ethernet, DDE, or RS232, 'and so on.'" Pet. 18–19 (citing Ex. 1007, 8). According to Petitioner, data between these two networks are "shared" using an "application interface" referred to as ISCCAN. *Id.* at 19 (citing Ex. 1007, 8, 11 ("The distributed blackboard

generated by the SC software *is extensive to the data in the CAN network*. Each computer node in the CAN network serves data to its running processes *through the homogeneous SC software interface*. The gateway software *ISCCAN performs specific translations between CAN protocol and SC data*.") (Petitioner's emphasis modified)); *see also* Ex. 1007, Fig. 1 (illustrating ISCCAN as a gateway between the hard real time (reactive) system and the soft real time (deliberative) system).

Petitioner identifies Posadas's disclosure of the two networks and two network protocols in an annotated version of Figure 4, reproduced below:

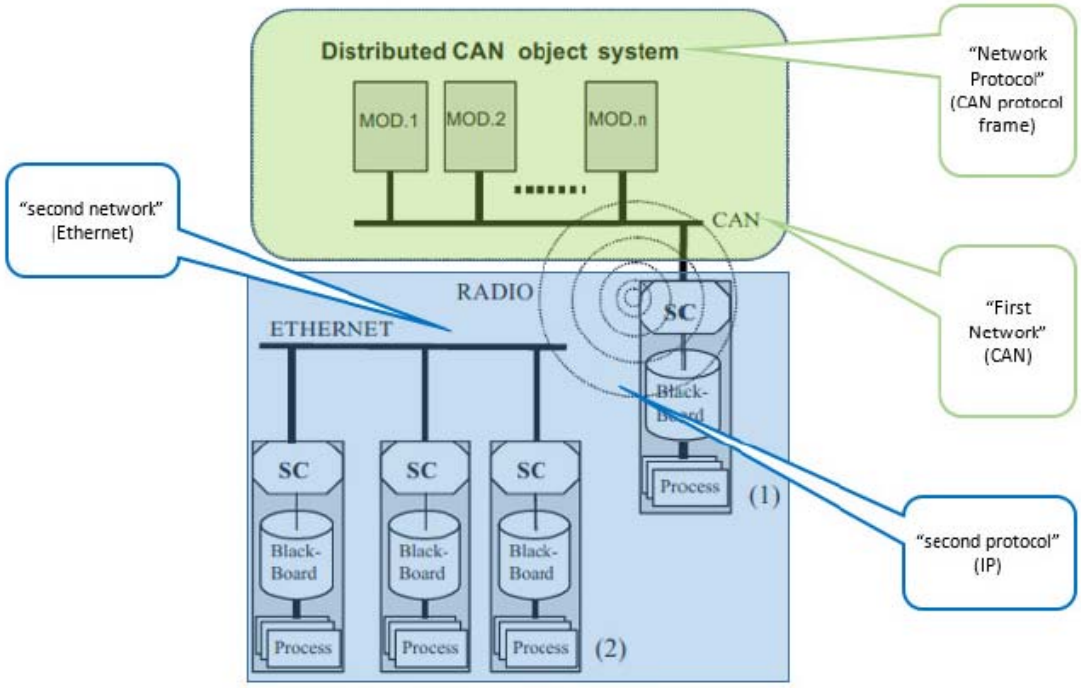

Fig. 4: Distributed blackboard structure.

Pet. 19 (citing Ex. 1007, 10, Fig. 4). As shown in annotated Figure 4, Petitioner contends that the first network and protocol are CAN, and the second network is Ethernet with IP as the claimed second network protocol. *Id.* (citing Ex. 1007, 9; Ex. 1005 ¶ 140). Petitioner's declarant,

Dr. Koopman, further explains that information is shared from the first network (CAN) with the second network (Ethernet) through the SC storage labeled (1), which distributes the information over the Ethernet to processes labeled (2). Ex. 1042 ¶ 43; *see* Pet. Reply 9–10.

Petitioner further contends that information is shared in "real-time," as required by the claim language. Pet. 20 (citing Ex. 1007, 11). Specifically, Petitioner cites a table in Posadas displaying test data results of response times that are between 1.096 milliseconds and 7.096 milliseconds, as well as Posadas's discussion of time periods for particular tasks that are less than one second. *Id.* at 20–21 (citing Ex. 1007, 11, 13, Table 1; Ex. 1005 ¶¶ 141–143).

Patent Owner argues that Posadas discloses only one network that stores data in and accesses data from the blackboard. PO Resp. 29–30 (citing Ex. 2006 ¶ 66). With reference to Figure 4, reproduced above, Patent Owner asserts that Posadas discloses a single, albeit distributed, storage resource, and that the only sharing of information is between the CAN network and the blackboard. *Id.* at 30. Essentially, Patent Owner contends that the Ethernet network shown in Figure 4 cannot be the claimed second network because information from the CAN network is only shared between the CAN network and the SC (1), not between the CAN network and the SC/processes (2) connected to the Ethernet. *See* Pet. Reply 9.

In its Reply, Petitioner advances the argument that Patent Owner "completely misinterprets Posadas by ignoring the Ethernet network expressly shown in Fig. 4." *Id.* (citing Ex. 1042 ¶ 40). We are persuaded that Patent Owner misreads Posadas, or at least misapprehends Petitioner's mapping of the different elements in Posadas's Figure 4 to the claimed first

and second networks and related limitations. As Petitioner explains in detail in its Reply, with the support of Dr. Koopman's declaration testimony, Petitioner asserts that information in Posadas is shared from the first (CAN) network with a second (Ethernet) network when information is stored in SC (1) and then distributed to other SCs and processes (2) using Ethernet (IP) protocol. Pet. Reply 9–10; Ex. 1042 ¶¶ 41–43. Dr. Miller's deposition testimony is consistent with Petitioner's interpretation of Posadas and supports Petitioner's identification of the CAN and Ethernet networks as the respective first and second networks. *See* Ex. 1043, 95:3–8, 99:11–100:6.

On the basis of the evidence, including the testimony of both parties' declarants, and the explanation provided by Petitioner, we find that Petitioner sufficiently shows that Posadas teaches limitation 51i, and we are not persuaded by Patent Owner's argument to the contrary.

Limitations 51j and 51k

Limitations 51j and 51k require

> [j] a first interface for interfacing with the first network, [k] the first interface including a first interface-related first component for receiving first data units and a first interface-related second component, the control unit being operable such that the first data units are processed after which processed first data units are provided.

Ex. 1001, 18:53–59. Petitioner identifies Posadas's ISCCAN software and bus controller for the CAN bus as the claimed "first interface" to the first (CAN) network. Pet. 22–23 (citing Ex. 1007, 10, 11, Figs. 3, 4). Petitioner further identifies Posadas's CAN message frames as the claimed "first data units" and provides an annotated version of Figure 1 showing alleged first interface-related first and second components:

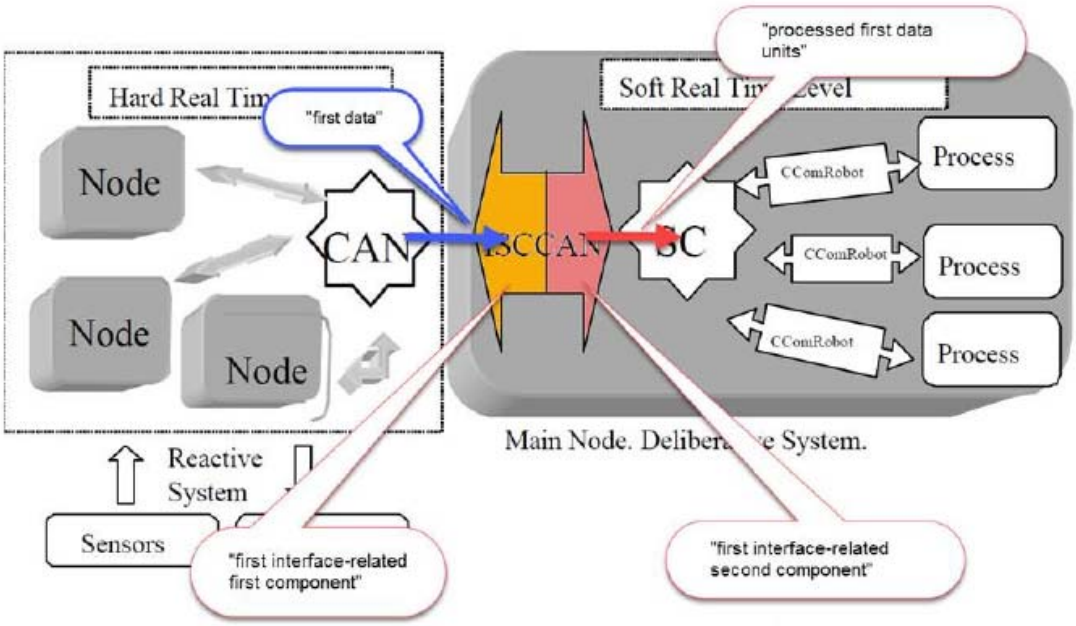

Fig. 1: Communication System Structure

Id. at 24. As shown in Petitioner's annotated Figure 1, Petitioner points to CAN network interface logic in the ISCCAN and the portion of the ISCCAN that translates raw CAN data to the SC format as the respective first and second components. *Id.* at 23–24 (citing Ex. 1007, 8, 10, 11).

Patent Owner states that it is "unlikely" that Posadas discloses the entirety of these limitations but provides no evidence or argument in support of that position. *See* PO Resp. 31; Ex. 2006 ¶ 71 (Dr. Miller testifying that he "will pass on these" limitations). Accordingly, Patent Owner's argument is unpersuasive. Based on Petitioner's explanation, we determine that Petitioner sufficiently identifies disclosure in Posadas that teaches these limitations.

Limitation 51l

For limitation 51l, which recites that "the first network is at least one of a Controller Area Network type, a Flexray network type, or a Local

Interconnect Network type," Petitioner relies on Posadas's disclosure of a CAN network. Pet. 25. We agree that Posadas discloses CAN as a first network, which Patent Owner does not contest.

Limitations 51m and 51n

Limitations 51m and 51n require

> [m] a second interface for interfacing with the second network, [n] the second interface including a second interface-related first component for receiving second data units and a second interface-related second component, the control unit being operable such that the second data units are processed after which processed second data units are provided.

Ex. 1001, 18:63–19:2. Petitioner identifies Ethernet frames received from Posadas's Ethernet network for storage in memory as the claimed "second data units." Pet. 27. For the claimed second interface and the second interface-related first and second components, Petitioner points to the wireless Ethernet link shown, for example, in Figure 4 of Posadas and different parts of SC (1). *Id.* at 27–28. According to Petitioner, SC (1) receives IP frames via an Ethernet link and processes them to store them as SC objects (i.e., the claimed "processed second data units") in SC (1). *Id.* (citing Ex. 1007, 9, Fig. 4; Ex. 1005 ¶ 160).

Patent Owner argues, as it does with respect to limitation 51i, that Posadas does not disclose sharing information with a second network. PO Resp. 32–34. As explained above, we are not persuaded by this argument. We find that Petitioner adequately identifies disclosure in Posadas corresponding to limitations 51m and 51n.

Limitation 51o

Limitation 51o recites that "the second network is at least one of the Controller Area Network type, the Flexray network type, or the Local

Interconnect Network type." Ex. 1001, 19:3–5. The second network in Posadas relied on by Petitioner is Ethernet, but Posadas also teaches that other networks (e.g., "DDE, RS232, and so on") can be used. Ex. 1007, 8. Petitioner argues that it would have been obvious to use a Local Interconnect Network (LIN) or FlexRay as the second network. Pet. 29. With support from Dr. Koopman, Petitioner asserts that LIN and FlexRay were well known before the effective filing date of the '843 patent and were known to work well in tandem with a CAN network. *Id.* (citing Ex. 1005 ¶ 166). Petitioner cites Wense as a particular use of LIN and CAN together in an automotive environment. *Id.* at 29–30 (citing Ex. 1009, 13). Specifically, Wense describes the use of LIN in the same hierarchical network as CAN. Ex. 1009, 13, Fig. 3. Wense also discloses FlexRay as an alternative network that can be used in automotive applications, particular for safety control systems such as braking and steering. Pet. 31 (citing Ex. 1009, 11).

Petitioner contends that a person of ordinary skill in the art would have combined the teachings of Wense with Posadas for a variety of reasons. *Id.* at 31–37 (citing Ex. 1005 ¶¶ 171–178). For example, Petitioner asserts that Posadas and Wense are in the same field of endeavor (distributed systems in a multiplex networking environment) and are concerned with integrating communications among hybrid electronic control modules and networks. *Id.* at 32–33. Although Posadas describes a robotic system and Wense focuses on automotive systems, Petitioner contends a person of ordinary skill in the art would readily have considered references in the automotive industry in combination with Posadas. *Id.* at 33 (citing Ex. 1005 ¶ 173). Indeed, Posadas recognizes that the CAN bus used in the disclosed robot was initially developed for the automotive industry. Ex. 1007, 9.

Petitioner also notes that Wense itself explains that LIN was created as a solution for low-end communication that is complementary to CAN, which typically is used in systems such as the engine control network that require higher-end communications. *Id.* at 34 (citing Ex. 1009, 11). Further, Petitioner points out that Figure 1 of Wense illustrates the relative advantages of LIN and FlexRay. *Id.* at 35–36 (citing Ex. 1009, 11, Fig. 1).

Patent Owner does not address Petitioner's analysis of this limitation or its rationale for combining Wense with Posadas and Stewart, other than repeating its argument that Posadas does not teach a second network. PO Resp. 34. For the reasons set forth in the Petition, exemplified by the discussion above, we determine that Petitioner sufficiently articulates reasons with rational underpinning for why a person of ordinary skill in the art would have combined the teachings of Wense with those of Posadas, as modified by Stewart. *See* Pet. 34–39.

Summary

Petitioner adequately shows that the combination of Posadas, Stewart, and Wense teaches or suggests the limitations of claim 51 and provides sufficient reasoning for combining the references in the manner asserted.

2. Claim 1

Petitioner asserts that independent claim 1 is similar to claim 51. *Id.* at 44. As for the differences, Petitioner relies on Posadas for disclosing a "non-transitory computer-readable medium storing a computer program for sharing information" and computer code for carrying out the steps recited in the claim. *Id.* at 44–45 (citing Ex. 1007, 8–11). Claim 1 also recites "code for *allowing receipt* of information associated with a message received utilizing a first network protocol associated with a first network." Ex. 1001,

12:19–21 (emphasis added). Petitioner contends that Posadas discloses allowing receipt of information, specifically describing how the ISCCAN interface receives a CAN frame associated with a CAN network. Pet. 45 (citing Ex. 1007, 11). Petitioner otherwise relies on its analysis with respect to claim 51. *Id.* at 45–46.

Patent Owner presents no separate arguments directed to claim 1. *See* PO Resp. 36–37. We find that Petitioner's analysis sufficiently accounts for the differences between claim 1 and claim 51. For that reason and the reasons discussed with respect to claim 51, Petitioner adequately shows that the combination of Posadas, Stewart, and Wense teaches or suggests the limitations of claim 1 and provides sufficient reasoning for combining the references.

3. Claims 52 and 53

Claims 52 and 53 require the "processed first data units" and the "second data units" recited in claim 51 to have a "same format" (claim 52) and to be the "same data units" (claim 53). The written description of the '843 patent does not refer specifically to "data units" but does describe a "packet data unit (PDU)" as "the datum or core information carried by the overall message" that remains after a communicated message is processed by removing headers associated with network layers. Ex. 1001, 6:43–51; *see also id.* at 9:52–55, 9:67–10:1 (referring to data stored in the bulletin board (i.e., data that has been processed to remove header information) as "packet data units"). Petitioner's declarant, Dr. Koopman, opines that the "packet data units" referred to in the written description are the same as the "data units" recited in the claims. Ex. 1042 ¶ 47. Based on this interpretation, Petitioner contends that "[t]he claims simply require 'data

units' (*i.e.*, data) on the first and second data networks to be the same/have the same format." Pet. Reply 11. Specifically, Petitioner asserts that the claims require data that have been processed on the first network to have the same format or be the same data as data on the second network, although the latter "may still be encapsulated in a network frame such that the data itself has not been removed (*i.e.*, it is unprocessed)." *Id.* (citing Ex. 1042 ¶¶ 47–48).

In its Response, Patent Owner argues that the "processed first data units" are the first network messages that have been processed to remove addressing specific to the first network protocol and the "second data units" are "encapsulated for transmission according to the second network protocol." PO Resp. 35. Thus, according to Patent Owner, Posadas would only teach these limitations if a CAN frame with its header removed (the processed first data units) were identical to an Ethernet frame (the second data units). *Id.* Patent Owner, however, does not cite any disclosure in the written description of the '843 patent that supports its view. *Id.* Nor does Dr. Miller's declaration point to any support in the written description for Patent Owner's position. *See* Ex. 2006 ¶ 82.

We are persuaded that Petitioner's argument is better supported by the record than Patent Owner's. Patent Owner argues that the claims require data on the first network, already processed to remove headers associated with the first network protocol, to be the same or have the same format as a network frame on the second network (i.e., data encapsulated according to the second network protocol). *See* Pet. Reply 11. We agree with Petitioner that Patent Owner's argument is inconsistent with the written description of the '843 patent, which nowhere describes such a scenario. *See id.* at 11–12.

As Petitioner notes, the '843 patent primarily is directed to "making the same data available from one network to another (even if the encapsulation used in creating the network message differs between networks using different protocols)." *Id.* at 12 (citing Ex. 1001, 1:29–33, 3:46–59, 6:47–57, 7:4–15, 8:13–63, 11:66–12:3; Ex. 1042 ¶ 50). This suggests that the claim language requiring data units to be the "same data units" or the "same format" refers to the *same data or information* itself. Such a reading is also consistent with the description of packet data units in the '843 patent as "the datum or core information carried by the overall message." Ex. 1001, 6:50–51. Notably, Dr. Miller also testifies on cross-examination that the packet data unit disclosed in the '843 patent represents only the data that is left after protocol-specific information such as headers is removed. Ex. 1043, 68:11–22, 69:19–70:11.

With this understanding of the claims, we are persuaded by Petitioner's contention that Posadas teaches or suggests the limitations in claims 52 and 53. *See* Pet. 38–39. Specifically, Petitioner contends that CAN message frames are translated by ISCCAN for storage in the blackboard as SC objects, and IP frames containing the translated CAN data for use by deliberative processes are communicated via Ethernet link, so that bit-by-bit copies of CAN messages are sent out to the Ethernet network. *See id.* (citing Ex. 1007, 9–11); *see* Ex. 1005 ¶¶ 182, 184–185; Ex. 1042 ¶¶ 50–52. Moreover, Posadas also teaches communicating "CAN raw data," which Dr. Miller testifies is an entire CAN frame. Ex. 1007, 11; Ex. 1043, 96:25–97:24. Based on this testimony, Petitioner also persuasively argues that Posadas teaches or suggests "transmitting a CAN frame encapsulated in an Ethernet frame, from the Ethernet network," thus satisfying the recited

limitations even under Patent Owner's construction. Pet. Reply 12–13 (citing Ex. 1007, 11; Ex. 1042 ¶ 53).

Petitioner also contends that the limitations of claims 52 and 53 are taught by Upender and that a person of ordinary skill in the art would have combined Upender with Posadas, Stewart, and Wense. Pet. 78–83. Under this separate ground of alleged unpatentability, Petitioner cites Upender for its disclosure of a "CAN-to-CAN topology" that supports transmission of "same message types" from one CAN to another. *Id.* at 79–80 (citing Ex. 1038, 2:17–23, 2:34–37, 2:45–50, Figs. 1, 2). Patent Owner does not specifically address the teachings of Upender relied on by Petitioner, other than to state that Upender cannot "salvage" the problem raised by Patent Owner regarding Posadas. PO Resp. 59. We find that the disclosure in Upender relied on by Petitioner sufficiently teaches processed first data units and second data units having a "same format" and being the "same data units" as claimed.

With support from Dr. Koopman, Petitioner provides several reasons for combining Upender with the other references. Pet. 80–83; *see* Ex. 1005 ¶¶ 321–328. For example, Petitioner asserts that both "relate to real-time distributed computer control systems with a shared memory architecture." Pet. 81 (citing Ex. 1005 ¶ 322; Ex. 1007, 8; Ex. 1038, Abstract, 1:35–48). Also, combining the teachings of Upender with Posadas results in both the first and second networks being CAN, and Petitioner contends that using two networks of the same type would have been well within the level of ordinary skill in the art. *Id.* at 82 (citing Ex. 1005 ¶ 325). We note that claims 52 and 53, which depend from claim 51, do not require the two networks to be of different types. Having considered the parties' arguments

and evidence, we determine that Petitioner provides sufficient reasoning with rational underpinning for combining Upender with Posadas, Stewart, and Wense.

For the reasons discussed, we conclude that Petitioner shows by a preponderance of the evidence that claims 52 and 53 are unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense, and that claims 52 and 53 also are unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, Wense, and Upender.

4. Claim 54

Claim 54 depends from claim 51 and recites that "the apparatus is operable such that the processing involves headers." Ex. 1001, 19:13–15. Petitioner adequately identifies disclosure in Posadas of CAN and Ethernet network protocols that include network headers, such that processing of frames into SC objects would involve those headers. Pet. 39 (citing Ex. 1007, 10–11; Ex. 1005 ¶ 187). Patent Owner does not respond to this contention, and we find that Petitioner makes a sufficient showing.

We conclude that Petitioner shows by a preponderance of the evidence that claim 54 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

5. Claim 55

Claim 55 depends from claim 51 and recites that "the apparatus is operable such that the first network and the second network are heterogeneous networks." Ex. 1001, 19:16–18. Petitioner asserts that Posadas discloses two different networks—a first network that is CAN and a second network that can be Ethernet. Pet. 40 (citing Ex. 1007, 8, 11). Patent

Owner does not address this claim, and we find that Petitioner makes a sufficient showing.

We conclude that Petitioner shows by a preponderance of the evidence that claim 55 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

6. Claim 56

Claim 56 depends from claim 51 and recites that "the apparatus is operable such that the second network protocol is different than the first network protocol." Ex. 1001, 19:19–21. Referring to its analysis for claim 51, Petitioner asserts that Posadas discloses two different network protocols—CAN and Ethernet (IP). Pet. 42. Patent Owner does not respond to this contention. For the reasons discussed previously, we agree with Petitioner's analysis.

We conclude that Petitioner shows by a preponderance of the evidence that claim 56 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

7. Claim 57

Claim 57 depends from claim 51 and recites that "the apparatus is operable such that the second network protocol is different than the first network protocol such that rates thereof are different." Ex. 1001, 20:1–4. Petitioner contends that Posadas discloses a CAN network running at a rate of 1 Mbps, as explicitly shown in Figure 3 of Posadas. Pet. 42–43 (citing Ex. 1007, 11, Fig. 3). Petitioner also contends that Posadas discloses wireless Ethernet, which had data rates up to 54 Mbps in 2000, as shown in the IEEE 802.11a standard. *Id.* at 43 (citing Ex. 1040, 11; Ex. 1005 ¶ 196).

Patent Owner does not address this claim, and we find that Petitioner makes a sufficient showing.

We conclude that Petitioner shows by a preponderance of the evidence that claim 57 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

8. Claim 58

Claim 58 depends from claim 51 and is similar to claim 57, with the additional requirement that the two different network protocols have different message formats such that the information is converted from one format to the other. Ex. 1001, 20:5–12. Petitioner contends that Posadas discloses the sharing of data between two networks—CAN and another network, such as Ethernet—using ISCCAN, which "'performs specific translations between CAN protocol and SC data.'" Pet. 44 (quoting Ex. 1007, 11). We find that Petitioner makes a sufficient showing with respect to this claim, which Patent Owner does not address.

We conclude that Petitioner shows by a preponderance of the evidence that claim 58 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

9. Claim 59

Claim 59 depends from claim 51 and recites:

> the apparatus is operable such that the information is originally received in a first message format corresponding to the first network protocol and processed to create, in real-time, messages in at least two other message formats including a second message format corresponding to the second network protocol and a third message format corresponding to a third network protocol, where the first network protocol is different than either of the second and third network protocols.

Ex. 1001, 20:13–20. This claim is similar to claim 56, with the additional requirement of a third network using a third network protocol different from the other two.

Petitioner relies on Posadas for teaching the first and second networks and protocols. Pet. 74. As for the third network and protocol, Petitioner contends that adding a third network to Posadas was well within the level of ordinary skill and would have been a "minor and trivial design choice." *Id.* at 74–75. Petitioner cites Zhao as an example of one of "many references disclosing three networks." *Id.* at 75 (citing Ex. 1039). According to Petitioner, Zhao explicitly explains that its disclosed network topology includes more than two networks. *Id.* at 75–76 (citing Ex. 1039 ¶ 26 (describing a communication system that may include any number of network servers coupled to different networks)).

Petitioner also articulates reasons for combining Zhao's disclosure of three networks with the teachings of Posadas. *Id.* at 76–78. For instance, Petitioner alleges that Posadas's disclosure that its system can be used with a variety of networks would have suggested to a person of ordinary skill in the art that "Posadas could readily be used with more than two networks." *Id.* at 76 (citing Ex. 1007, 8 (stating that the networks can include "CAN, [E]thernet, DDE, RS232, and so on"); Ex. 1005 ¶ 307). Further, Petitioner asserts that Posadas and Zhao are in the same field of network communications, Zhao's shared database environment is similar to Posadas's shared memory architecture, and "[m]odifying Posadas to include one of the well-known networks described in Zhao ([e.g.,] RS-485, MODEM, IEEE 1394, USB, CEBus, Bluetooth) would have been a

predictable combination amounting to no more than a simple design choice." *Id.* at 77 (citing Ex. 1039 ¶¶ 28, 62; Ex. 1005 ¶ 311).

Patent Owner challenges Petitioner's rationale for combining Zhao with Posadas. PO Resp. 55–57. Specifically, Patent Owner contends that "Posadas is directed to a problem involving real-time control in an embedded deterministic network, whereas Zhao is directed to connecting various devices to the Internet, a non-deterministic network which does not guarantee response times (or guarantee responses at all)." *Id.* at 56–57 (citing Ex. 1039 ¶ 2). As Petitioner points out, however, Zhao does disclose real-time read and write commands and timeout errors when responses are not received, so that "[w]hen desired, the real time read and write commands enable the client to access the intelligent devices timely." Pet. Reply 23 (citing Ex. 1039 ¶¶ 60–61, 63–64, 74; Ex. 1042 ¶ 83). We are persuaded that Zhao and Posadas disclose sufficiently similar shared environments that a person of ordinary skill in the art would have applied Zhao's teaching of a system with more than two distinct networks and network protocols to modify Posadas to include three distinct networks and network protocols.

For these reasons, we conclude that Petitioner shows by a preponderance of the evidence that claim 59 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, Wense, and Zhao.

10. Claim 2

Claim 2 depends from claim 1 and recites that "the computer program product is operable such that the determination as to whether the storage resource is available is made utilizing an initial request in connection with the storage resource." Ex. 1001, 12:64–67. For this limitation, Petitioner observes that Stewart describes a "spin-lock," which uses a "test-and-set

(TAS)" operation to determine memory availability. Pet. 47 (citing Ex. 1008, 11). The TAS algorithm makes an initial request by reading the current lock value from memory and, if the original value is 0, the task acquires the lock (i.e., it determines that the storage resource is available). *Id.* (citing Ex. 1008, 11).

Patent Owner argues only that a person of ordinary skill in the art would not have been motivated to combine Stewart with Posadas. PO Resp. 38. This argument is unpersuasive for the reasons discussed with respect to claim 51.

We conclude that Petitioner shows by a preponderance of the evidence that claim 2 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

11. Claim 3

Claim 3 depends from claim 1 and recites that "the computer program product is operable such that the storage resource includes a bulletin board resource." Ex. 1001, 13:2–4. The written description of the '843 patent provides that, "[i]n the context of the present invention, the bulletin board may refer to any database that enables users to send and/or read electronic messages, files, and/or other data that are of general interest and/or addressed to no particular person/process." *Id.* at 5:9–13.

Petitioner identifies Posadas's distributed blackboard structure as the claimed "bulletin board resource." Pet. 47–48 (citing Ex. 1007, 8, 10, Fig. 4). Petitioner also notes that Posadas discloses that the distributed blackboard structure is used for sharing data between different processes. *Id.* at 48 (citing Ex. 1007, 11 ("The mapped mode allows processes running

in every node of the IP network access to the CAN information through the SC software and the defined notification scheme.")).

Patent Owner contends that Posadas's distributed blackboard "is not the same as" the bulletin board described in the '843 patent. PO Resp. 38. In particular, Patent Owner asserts that in Posadas's blackboard, "every silo has its own SC interface, processor and only part of the entire blackboard," whereas the approach in the '843 patent "uses a common, or shared storage system that is connected to all of the system networks through network interfaces." *Id.* at 39 (quoting Ex. 1001, 7:30–37). As Petitioner points out, however, claim 3 does not require a common storage system connected to *all* of the system networks. *See* Pet. Reply 13 (citing Ex. 1042 ¶ 55). To the contrary, the written description of the '843 patent states that, similar to Posadas's blackboard, the shared "information may be replicated among a plurality of the bulletin boards." Ex. 1001, 1:35–37. In any event, as discussed above in connection with claim 51, Dr. Miller agrees on cross-examination that Posadas discloses a central shared memory (SC (1)) that distributes information from the CAN network to other processes over the wireless Ethernet network, thus qualifying as the claimed "bulletin board resource." Ex. 1043, 99:11–100:6; *see* Pet. Reply 13–14.

For these reasons, we conclude that Petitioner shows by a preponderance of the evidence that claim 3 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

12. Claims 4–6

Claims 4–6 depend from claim 1 and respectively recite that the computer program product is operable such that the storage resource "includes a shared memory," "stores messages that are addressed to no

particular process," and "stores messages available by any number of processes." Ex. 1001, 13:5–17. Petitioner contends that Posadas discloses a "shared memory" for the same reasons discussed in connection with limitation 51d of claim 51. *See* Pet. 48. Patent Owner does not contest Petitioner's showing for claim 4.

Petitioner addresses the limitations of claims 5 and 6 with descriptions of Posadas's distributed blackboard as "extensive to the data in the CAN network" and including a "mapped mode" that "allows processes running in every node of the IP network access to the CAN information through the SC software." *Id.* at 49 (citing Ex. 1007, 11). Thus, Petitioner contends, the distributed blackboard in Posadas stores messages that are available to any number of processes and not addressed to a particular process. *Id.*

Patent Owner argues that Petitioner does not take into account that each computer on a node in Posadas's Ethernet network has only a "'partial copy' of the blackboard," so that "individual processes 'execute only local accesses to the SC program'" after the SC distributes CAN binary streams for "'selective processing.'" PO Resp. 40 (quoting Ex. 1007, 10–11). In Patent Owner's view, these "descriptions are not consistent with the language of the claims, because they show that stored data is only directed to or available to particular processes, and not all processes." *Id.* (citing Ex. 2006 ¶ 95).

Having reviewed the arguments and evidence presented by the parties, we are persuaded that Petitioner sufficiently shows that Posadas teaches the limitations of claims 5 and 6. We agree with Petitioner that Patent Owner misreads Posadas, and indeed Patent Owner's quotation from Posadas is inaccurate and incomplete. *See* Pet. Reply 14; PO Resp. 40. Posadas

expressly discloses that "[i]t is important to emphasize that the processes, *independently of their location, have only to execute* local accesses to the corresponding SC program instance in order to contact all the system." Ex. 1007, 10 (emphasis added). Petitioner also argues persuasively, with support from Dr. Koopman, that a person of ordinary skill in the art would have known that CAN headers do not have destination fields, so that CAN frames from Posadas's first network cannot be addressed to a particular process. Pet. Reply 14 (citing Ex. 1042 ¶ 59). Moreover, as asserted in the Petition, Posadas discloses a "mapped mode [that] *allows processes running in every node in the IP network access to the CAN information* through the SC software and the defined notification scheme." *Id.* at 11 (emphasis added). We find that these disclosures in Posadas teach storing messages that are "addressed to no particular process" and "available by a number of processes," as recited in claims 5 and 6.

For these reasons, we conclude that Petitioner shows by a preponderance of the evidence that claims 4–6 are unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

13. Claims 7 and 8

Claims 7 and 8 each depend from claim 1 and respectively recite that the computer program product is operable such that the storage resource "is a section of a storage" and "involves a database." Ex. 1001, 13:14–21. We agree with Petitioner that Posadas teaches these limitations. *See* Pet. 49–50. For claim 8, Petitioner cites Posadas's disclosure that "[t]he SC makes an internal representation of the data objects using a distributed blackboard architecture," and the blackboard is formed from a "data structure." *Id.* at 50 (citing Ex. 1007, 8). With support from Dr. Koopman, Petitioner asserts that

Posadas's data structure that includes data objects is a database, defined as "a structured set of data," so that Posadas's storage resource (SC) "involves a database" as claimed. *Id.* (citing Ex. 1005 ¶ 221). Patent Owner does not dispute Petitioner's showing, which we find to be persuasive.

With respect to claim 7, Petitioner points to various sections of storage in Posadas that together comprise "a storage." *Id.* at 49–50. Patent Owner argues that shared sections of memory on the CAN bus are not subsections of a storage and are unrelated to the distributed blackboard. PO Resp. 40–41. Notwithstanding Patent Owner's argument, we find that Posadas describes a storage resource (i.e., SC (1) in Figure 4) that stores information from the first network (CAN) that is part of "a storage" (i.e., the distributed blackboard structure).

We conclude that Petitioner shows by a preponderance of the evidence that claims 7 and 8 are unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

14. Claims 9–13

Claims 9, 10, 11, 12, and 13 each depend from claim 1 and respectively recite that the computer program product is operable such that the request is "a re-request," "a storage resource request," "repeated until the storage resource is available unless a certain time beyond the threshold has elapsed," "another storage resource request," and "for access to the storage resource." Ex. 1001, 13:25–44. For these limitations, Petitioner relies on Stewart's disclosure of a spin-lock and TAS algorithm that determines whether a global shared memory table is available before writing to it by reading the current lock value and then writes a "1" to the lock table to lock the memory, as discussed above with respect to limitations in claim 51.

Pet. 50–52 (citing Ex. 1008, 6–7, 9, 11). Stewart also describes a task trying to access the global state variable table in shared memory that must continually retry accessing the table, waiting a particular amount of time ("polling time") between retries. Ex. 1008, 11. In addition, Stewart describes a "time-out period," for retries, after which the task will not perform memory storage. *Id.* Patent Owner repeats its unpersuasive argument that a person of ordinary skill in the art would not have combined Stewart with Posadas. PO Resp. 41–44. We find that Petitioner identifies sufficient disclosure in Stewart to teach or suggest the recited limitations.

We conclude that Petitioner shows by a preponderance of the evidence that claims 9–13 are unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

15. Claims 14 and 15

Claims 14 and 15 each depend from independent claim 1 and recite that the computer program product is operable such that the "determining, causing, and threshold" are each associated with "a same layer of processing" and with "a middleware layer that sits under an application layer." Ex. 1001, 13:45–53. For these limitations, Petitioner refers to "Stewart's memory operations [that] all employ a 'state variable table mechanism,' which he has 'integrated into the Chimera II Real-Time Operating System.'" Pet. 53 (citing Ex. 1008, 7). According to Petitioner, the determining, causing, and threshold in Stewart are associated with the global state variable table mechanism, which is a "same layer of processing" as required by claim 14. *Id.* Patent Owner does not dispute this aspect of Petitioner's analysis, which we find persuasive.

Petitioner also contends that the global state variable table mechanism is at a middleware layer sitting under an application layer, as required by claim 15. *Id.* (citing Ex. 1005 ¶ 238). Petitioner provides an annotated version of Stewart's Figure 2 identifying the global state variable table as a middleware layer and the tasks that access the table at an application layer. *Id.* at 54; *see* Ex. 1008, 7, Fig. 2.

Patent Owner takes issue with Petitioner's reliance on Figure 2 of Stewart, arguing that it does not label the global state variable table as "middleware" and does not show it between two other layers. PO Resp. 45. Further, Patent Owner argues that Stewart's integration of the global state variable table into the operating system is inconsistent with a definition of a "middleware layer" in the '843 patent, which distinguishes a middleware layer from a real-time operating system layer (RTOS). *Id.* (citing Ex. 1001, Fig. 4).

We are not persuaded by Patent Owner's argument. Although Figure 4 of the '843 patent illustrates a real-time operating system and middleware layer as separate layers, they are both shown as part of the same embedded software package, as Patent Owner's declarant, Dr. Miller, acknowledges. *See* Pet. Reply 17 (citing Ex. 1043, 132:5–11). Furthermore, Figure 4 of the '843 patent shows only one embodiment of the software architecture, and the '843 patent describes middleware broadly. Ex. 1001, 4:45–62 (describing various functions of middleware in different embodiments, including one in which the middleware interfaces directly with input/output mechanisms without utilizing an operating system); *see* Pet. Reply 16. Moreover, Stewart discloses that "it is also necessary to have a layer of abstraction between the RTOS and control algorithms that makes

the implementation efficient, allows for easily expanding and/or changing the control strategies, and reduces development costs by incorporating the concept of reusable software." Ex. 1008, 6. We credit Dr. Koopman's testimony that the layer referred to is Stewart's state variable table mechanism because that reading is consistent with Figure 2 of Stewart, and we agree with Dr. Koopman's conclusion that "a person of skill in the art would fairly characterize the state variable mechanism as middleware." Ex. 1042 ¶ 66.

For these reasons, we conclude that Petitioner shows by a preponderance of the evidence that claims 14 and 15 are unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

16. Claim 16

Claim 16 depends from claim 1 and recites that the computer program product is operable such that "the sharing includes providing the information to a plurality of software or hardware operations that share the storage resource." Ex. 1001, 13:55–59. Petitioner points to Posadas's description of a "mapped mode" that "allows processes running in *every node* of the IP network access to the CAN information through the *SC software*." Ex. 1007, 11 (emphasis added); Pet. 54. Patent Owner does not address Petitioner's identification, which we find sufficient to show this claim would have been obvious over the combined references.

We conclude that Petitioner shows by a preponderance of the evidence that claim 16 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

17. Claim 17

Claim 17 depends from claim 1 and recites that "the computer program product is operable such that the electronic control unit is equipped with at least one gateway function." Ex. 1001, 13:61–63. Petitioner addresses this limitation by citing Posadas's ISCCAN, described as "gateway software" that "performs specific translations between CAN protocol and SC data." Ex. 1007, 11; Pet. 55. Patent Owner does not dispute this showing, which we find persuasive.

We conclude that Petitioner shows by a preponderance of the evidence that claim 17 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

18. Claims 18–20

Claims 18–20 each depend from claim 1 and respectively recite that the computer program product is operable such that the real-time involves a response time that "is measured in milliseconds," "is measured in microseconds," and "is less than 1 second." Ex. 1001, 13:65–14:8. Petitioner addresses these limitations with the table in Posadas displaying test data results of response times that are between 1.096 milliseconds and 7.096 milliseconds, as well as Posadas's discussion of time periods for particular tasks that are less than one second, as discussed above in connection with limitation 51i of claim 51. Pet. 56 (citing Ex. 1007, 13, Table 1; Ex. 1005 ¶ 247). As these times are less than one second, Petitioner adequately shows, consistent with our construction of "real-time," that Posadas teaches these limitations. Patent Owner does not dispute Petitioner's contentions.

We conclude that Petitioner shows by a preponderance of the evidence that claims 18–20 are unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

19. Claim 21

Claim 21 depends from claim 1 and recites that the computer program product is operable such that "the first network or the second network is of the Controller Area Network type." Ex. 1001, 14:11–13. As discussed previously, Petitioner relies on Posadas's CAN network as the recited "first network." Patent Owner does not address this claim.

We conclude that Petitioner shows by a preponderance of the evidence that claim 21 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

20. Claims 22 and 23

Claims 22 and 23 depend from claim 1 and respectively require the first network or the second network to be a FlexRay network or a Local Interconnect Network (LIN). Ex. 1001, 14:14–21. Petitioner relies on Wense for disclosing these limitations. Pet. 57–58. As discussed in connection with limitation 51o, Petitioner relies on Wense for teaching the use of LIN in the same network as CAN in an automotive environment. *Id.* at 57 (citing Ex. 1009, 11–13, Figs. 2, 3). Petitioner further cites Wense for disclosing FlexRay as an alternative network that can be used, noting that it is one of the preferred communication methods for safety control systems, such as braking and steering, and has a higher data rate than CAN or LIN. *Id.* (citing Ex. 1009, 11, Fig. 1).

Patent Owner argues that "[f]or reasons already stated, a person of ordinary skill in the art would not have been motivated to combine Wense

with Posadas." PO Resp. 46. But the Response nowhere provides such reasons, as suggested by the cross-referencing error in the citation following Patent Owner's contention. *Id.* ("*See* ¶ Error! Reference source not found,. *supra*.") (emphasis omitted).

We agree with Petitioner that, in view of Wense's teachings about FlexRay and LIN as alternative networks in automotive systems, it would have been obvious to modify Posadas to include a FlexRay network or LIN. *See* Pet. 57 (citing Ex. 1005 ¶¶ 251–252). Accordingly, we conclude that Petitioner shows by a preponderance of the evidence that claims 22 and 23 are unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

21. Claim 24

Claim 24 depends from claim 1 and recites specific structure for each of the interface-related layer parts. Specifically, the claim requires that "the first interface-related first layer part or the second interface-related first layer part include[] at least one of a controller, a communication interface, or an operating system interface," and that "the first interface-related second layer part or the second interface-related second layer part include[] at least one of a remote conversion layer, a communication interface, or an operating system interface." Ex. 1001, 14:22-31. Petitioner focuses on the "communication interface" recited within each of the two limitations, and the correspondences in Posadas discussed above in connection with limitation 51k, for example, with respect to the first interface-related first and second layer parts. Pet. 58–61. In particular, Petitioner points to CAN network interface logic in ISCCAN as the "first interface-related first layer part" and the portion of ISCCAN that translates raw CAN data to the SC

format as the first interface-related second layer part. *Id.* (citing Ex. 1007, 7–8, 11). We agree with Petitioner's identification of these as "communication interfaces," which Patent Owner does not contest.

We conclude that Petitioner shows by a preponderance of the evidence that claim 24 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

22. Claim 25

Claim 25 depends from claim 1 and recites that the computer program product is operable such that "the first interface portion and the second interface portion are each separate portions of a same apparatus." Ex. 1001, 14:34–37. As discussed above with respect to limitations 51j and 51m in claim 51, Petitioner identifies first and second portions in Posadas, with the first interface portion including at least part of ISCCAN and the second interface portion including the wireless Ethernet link. *See* Pet. 61. These constitute "separate portions" of a single apparatus—Posadas's YAIR robot. *See id.* at 61–62 (citing Ex. 1007, 8, Fig. 4; Ex. 1005 ¶¶ 262–263). Thus, we find Petitioner sufficiently shows that Posadas discloses the limitation recited in claim 25. Patent Owner does not dispute this aspect of Petitioner's analysis.

We conclude that Petitioner shows, by a preponderance of the evidence, that claim 25 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

23. Claims 26–29

Claims 26–29 depend from claim 1 and recite substantially the same limitations as claims 55–58. *Compare* Ex. 1001, 14:38–59, *with id.* at 19:16–20:12. Petitioner's analysis is similar to that for claims 55–58, and

Patent Owner does not dispute that analysis. Pet. 62–64. For the same reasons discussed with respect to claims 55–58, we conclude that Petitioner shows by a preponderance of the evidence that claims 26–29 are unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

24. Claim 30

Claim 30 depends from claim 1 but otherwise is substantially similar to claim 59, which depends from claim 51 and requires three different networks and network protocols. Ex. 1001, 14:60–15:3. For the reasons explained with respect to claim 59, we conclude that Petitioner shows by a preponderance of the evidence that claim 30 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, Wense, and Zhao.

25. Claim 31

Claim 31 depends from claim 1 and recites that the computer program product is operable such that the storage resource "is protected utilizing semaphores." Ex. 1001, 15:6–7. For this limitation, Petitioner refers to Stewart's disclosure of different locking mechanisms for controlling memory access for multiprocessor applications, including "spin-locks, message passing, remote semaphores, and the multiprocessor priority ceiling protocol." Ex. 1008, 11 (internal citations omitted); *see* Pet. 64. Patent Owner argues that Stewart teaches away from the use of semaphores for memory access control because Stewart states "remote semaphores . . . require significant overhead, which is typically an order of magnitude greater than the data transfer itself." Ex. 1008, 11; *see* PO Resp. 46–47.

We are not persuaded that Stewart teaches away from the use of semaphores generally. Rather, we understand Stewart's statement regarding

significant overhead to refer to the Chimera II operating system used in Stewart's particular system. *See* Ex. 1008, 11 ("For example, the remote semaphores in Chimera II take a minimum of 44 μsec for the locking and unlocking operation . . . ."). Moreover, Petitioner and Dr. Koopman persuasively explain that Stewart's spin-lock, relied on for teaching various limitations in independent claims 1 and 51, is a type of semaphore. Pet. Reply 18; Ex. 1042 ¶ 67 (explaining that a "spin-lock is simply a 'binary semaphore' with N=1 that can deal with only one accessor at a time," rather than multiple concurrent accessors); *see also* Ex. 1043, 111:7–9 (Dr. Miller agreeing that "a spin-lock is a way to arbitrate access"); Microsoft Computer Dictionary, 472 (5th ed. 2002) (defining "semaphore" in programming as "a signal—a flag variable—used to govern access to shared system resources" that "indicates to other potential users that a file or other resource is in use and prevents access by more than one user").

For these reasons, we find that Petitioner sufficiently identifies the use of semaphores in Stewart to protect the storage resource. Accordingly, we conclude that Petitioner shows by a preponderance of the evidence that claim 31 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

26. Claim 32

Claim 32 depends from claim 31 and recites that "each of a plurality of different processes process the information in a manner that is isolated from temporal characteristics associated with the heterogeneous networks." Ex. 1001, 15:11–14. For this limitation, Petitioner asserts that the two networks in Posadas—CAN and a second network that is, for example, Ethernet—are different and therefore heterogeneous. Pet. 64–65. Regarding

temporal isolation, Posadas describes a "reactive" first system that obtains information from the robot's sensors to be made available to "deliberative" processes in the second network that typically relate to "sensory integration, data fusion and map building." Ex. 1007, 9, 11; *see* Pet. 65. Posadas explains that, according to Petitioner, "when temporal fusion is essential, 'time properties must be attached to sensor data and control actions.'" Pet. 65 (quoting Ex. 1007, 11). Petitioner further contends that in Posadas, "'[t]he time property attached to each SC blackboard object is in the form of a time firewall,' and based on this information, each process can calculate timing for each SC object." *Id.* (quoting Ex. 1007, 11). By maintaining this "time firewall," Petitioner asserts, "the SC system in Posadas isolates the temporal characteristics associated with the first (*e.g.*, CAN) network from the temporal characteristics of the second (*e.g.*, Ethernet) network." *Id.* (citing Ex. 1005 ¶ 272).

Patent Owner does not dispute Petitioner's contentions regarding this claim. We find that Petitioner's argument, with support from Dr. Koopman, sufficiently identifies disclosure in Posadas of processes that are isolated from the temporal characteristics of the networks. Accordingly, we conclude that Petitioner shows by a preponderance of the evidence that claim 32 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

27. Claim 33

Claim 33 depends from claim 32 and recites that the computer program product is operable such that "the information is stored in response to interrupts associated with the different processes." Ex. 1001, 15:15–18. Petitioner contends that Posadas teaches this limitation when it "describes

that '[t]he system is event driven. In this way, it is possible to associate the execution of code with specific events (for instance an event could be a change on a blackboard).' As a result, the processes 'automatically receive the values they need from blackboard objects.'" Pet. 66 (quoting Ex. 1007, 11) (internal citation omitted). Petitioner contends that a "change on the blackboard" is a "memory read/write action," and that Posadas's disclosure of triggering such actions by an "event" teaches storing information in response to interrupts. *Id.* (citing Ex. 1005 ¶ 274).

Patent Owner does not dispute Petitioner's contentions regarding this claim. We find that Petitioner's argument, with support from Dr. Koopman, sufficiently identifies disclosure that teaches the recited "interrupt" limitation. Accordingly, we conclude that Petitioner shows by a preponderance of the evidence that claim 33 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

28. Claim 34

Claim 34 depends from claim 32 and recites that the computer program product is operable such that "the different processes are updated with the information at a first rate that differs from a second rate with which the different processes send the information to the storage resource." Ex. 1001, 15:19–24. Petitioner contends this limitation is satisfied by Posadas's disclosure of two different networks—the "reactive system" using CAN with "hard real-time restrictions" and the "deliberative processes" implemented by nodes attached to the Ethernet network subject to "soft real-time restrictions." Pet. 66 (citing Ex. 1005 ¶ 276). Because the "hard" and "soft" portions of Posadas's system operate on networks with different

speeds, Petitioner asserts that they are updated at different rates. *Id.* at 67 (citing Ex. 1005 ¶¶ 276–278).

In response, Patent Owner argues that Petitioner's analysis does not show what the claim requires—a given process that sends information at a different rate from the rate at which it receives information. PO Resp. 47–48. In other words, Patent Owner contends that Petitioner does not point to any process in Posadas located in a given domain (CAN or Ethernet) that sends and receives information at different rates. *Id.* at 48. In its Reply, Petitioner reiterates its position that processes on one network would be updated at a different rate from processes on the other network.
Pet. Reply 18–19.

Neither party supports its argument with a claim construction based on the claim language and written description of the '843 patent. Although the claim may be unartfully drafted, we determine that Petitioner's broader implicit construction is reasonable. Claim 34 depends from claim 32, which recites "different processes" and "heterogeneous networks." In the Summary of the Invention, the '843 patent explains that information is shared "among a plurality of heterogeneous processes" using a bulletin board. Ex. 1001, 1:31–33. It further provides: "In use, the bulletin board may update the processes with information at a first rate that differs from a second rate with which the processes send the information to the bulletin board." *Id.* at 2:11–14. In the context of different processes running on heterogeneous (i.e., different) networks, we are persuaded that the claim scope encompasses some processes being updated with information at one rate and some processes sending information to storage at another rate, without the same process necessarily sending and receiving (i.e., being

updated) at different rates. Under this interpretation, Petitioner's identification in Posadas of two networks accessing memory and operating at different rates sufficiently shows the claim would have been obvious.

We conclude that Petitioner shows by a preponderance of the evidence that claim 34 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

29. Claim 35

Claim 35 depends from claim 1 and recites that the computer program product is operable such that "the storage resource is operable so as not to require a network layer translation of messages." Ex. 1001, 15:27–28. For this limitation, Petitioner asserts that in Posadas, "[t]he gateway ISCCAN performs specific translations between CAN protocol and SC data," but it also "supports communication of CAN raw data." Pet. 67 (citing Ex. 1007, 11). Dr. Koopman also testifies, with supporting evidence, that CAN "raw" data does not use a Network Layer. Ex. 1005 ¶ 280. We find that Petitioner sufficiently shows that Posadas discloses this limitation, which Patent Owner does not address.

We conclude that Petitioner shows by a preponderance of the evidence that claim 35 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

30. Claims 36, 37, and 46

Claims 36, 37, and 46 each depend from claim 1 and respectively recite that the computer program product is operable such that "the threshold includes a timeout," "the threshold includes a time-related threshold," and "a waiting period is implemented between re-requests for the storage resource." Ex. 1001, 15:29–35, 16:11–14. For these limitations, Petitioner cites

Stewart's disclosure of a "polling time" between retries and a "maximum waiting time," or "time-out period," after which no memory storage is performed. Pet. 68, 74 (citing Ex. 1008, 11). We agree with Petitioner that this aspect of Stewart meets the claim limitations, which Patent Owner does not dispute, aside from its unpersuasive argument that a person of ordinary skill in the art would not have combined Stewart with Posadas. *See* PO Resp. 48–49.

We conclude that Petitioner shows by a preponderance of the evidence that claims 36, 37, and 46 are unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

31. Claim 38

Claim 38 depends from claim 1 and requires the first interface-related and second interface-related first layer messages and second layer messages to include "protocol data units (PDUs)." Ex. 1001, 15:36–42. Petitioner's declarant, Dr. Koopman, testifies that a "protocol data unit" is "simply the data payload encapsulated in a network protocol." Ex. 1005 ¶ 285. Based on this meaning of "protocol data unit," Petitioner contends that the first interface-related first layer messages in Posadas (i.e., CAN frames), the first interface-related second layer messages (i.e., SC data in the form of the "ASCII-HEX representation of CAN binary streams"), the second interface-related first layer messages (i.e., Ethernet IP frames), and the second interface-related second layer messages (i.e., SC objects) are all "protocol data units." Pet. 68–69 (citing Ex. 1007, 10, 11). According to Petitioner, all of the above-referenced messages are "well-known standard protocols" having a "defined format." *Id.* at 69.

Patent Owner disagrees with Petitioner, contending that the SC data and SC objects associated with the ISCCAN software are not "standard protocols" but were developed specifically for the YAIR robot endeavor. PO Resp. 50–51 (citing Ex. 1007, 8, 10). Because Posadas describes the SC data as "ASCII-HEX representation of CAN binary streams" distributed to individual processes, Patent Owner asserts that "it is likely that SC data and SC objects are not encapsulated with second-layer protocol information and therefore not PDUs." *Id.* at 51.

Petitioner modifies its position in its Reply, stating that "a 'PDU' is simply data," and the "claims include no requirement that the protocol data units are 'encapsulated.'" Pet. Reply 19–20. Petitioner contends that Patent Owner's declarant, Dr. Miller, admits as much in his cross-examination testimony. *Id.* at 19. In any event, Petitioner continues, the data in Posadas are encapsulated when they are transmitted over the CAN or Ethernet network. *Id.* at 20.

Having reviewed the parties' arguments and evidence, we do not find that Petitioner sufficiently demonstrates that all of the "messages" recited in claim 38 are "protocol data units." First, Petitioner provides no explanation for its changing interpretation of "protocol data unit." We note that the written description of the '843 patent refers to "packet data units" but not "protocol data units." *See, e.g.*, Ex. 1001, 6:50–51. As discussed in connection with claims 52 and 53, the '843 patent describes a "packet data unit (PDU)" as "the datum or core information carried by the overall message" that remains after a communicated message is processed by removing headers associated with network layers. Ex. 1001, 6:43–51. In contrast, a standard technical definition for "protocol data unit" is "[a] unit

of data specified in a protocol and consisting of protocol information and, possibly, user data," rather than the user data itself. IEEE 100, THE AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS, 882 (7th ed. 2000). In deposition testimony, Dr. Miller makes this same distinction between a "protocol data unit," which contains bits associated with a protocol, and a "packet data unit," as described in the '843 patent, which contains only the data or information. Ex. 1043, 69:3–70:11.

In view of the customary meaning of "protocol data unit" and Dr. Miller's testimony, and Petitioner's failure to explain its change in position between the Petition and the Reply, we do not find Petitioner's identification of SC data and SC objects sufficient to show that Posadas teaches first interface-related second layer messages and second interface-related second layer messages that include protocol data units, as required by claim 38. We also are not persuaded by Petitioner's contention in its Reply that the CAN and Ethernet data must be encapsulated for transmission, because that statement appears to apply only to the *first* layer messages without specifically addressing the separate requirement that the *second* layer (i.e., processed) messages include protocol data units.

For these reasons, we conclude that Petitioner does not show by a preponderance of the evidence that claim 38 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

32. Claim 39

Claim 39 depends from claim 1 and recites that "the first interface-related first layer messages and the first interface-related second layer messages are different in terms of at least one aspect of headers thereof." Ex. 1001, 15:43–47. For this limitation, Petitioner cites the disclosure in

Posadas that the ISCCAN gateway "performs specific translations" between CAN frames, which are the first interface-related first layer messages, and SC data (e.g., the ASCII-HEX representation of CAN binary streams), which are the first interface-related second layer messages. Pet. 70 (citing Ex. 1007, 11). In view of the disclosed translation, Petitioner contends that a person of ordinary skill in the art would have understood that the headers differ between the first layer messages and second layer messages. *Id.* (citing Ex. 1005 ¶ 289).

In response, Patent Owner asserts that although Posadas's first layer CAN messages are translated to SC data, the messages do not appear to be "processed" and "likely retain their CAN header information." PO Resp. 52 (citing Ex. 2006 ¶ 126). Patent Owner bases its position on Posadas's description of SC data as "ASCII-HEX representation of CAN binary streams" that are distributed to individual processes for "selective processing." *Id.* (citing Ex. 1007, 11).

We are persuaded that Petitioner's position is better supported by the record than Patent Owner's. First, to the extent Patent Owner contends that the "selective processing" in Posadas corresponds to the processing of messages in claim 1, we disagree. In Petitioner's contentions, the translation or conversion of CAN frames to SC data corresponds to the processing of first layer messages, after which second layer messages are provided. *See* Pet. 70; *see also id.* at 24 (analyzing limitation 51k of claim 51). Second, the claim only requires "at least one aspect of headers" to be different between the first layer messages and the second layer messages. In his reply declaration, Dr. Koopman explains in detail how a conversion from CAN binary data to ASCII-HEX would result in a different encoding of header

information, which is within the scope of the claim. Ex. 1042 ¶¶ 77–79; *see* Pet. Reply 21. Thus, we find that Posadas's disclosed translation from CAN frames to SC data sufficiently teaches the claim limitation.

For these reasons, we conclude that Petitioner shows by a preponderance of the evidence that claim 39 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

33. Claim 40

Claim 40 depends from claim 1 and recites that "the processing includes conversion," the "first interface-related first layer messages" are received by the "first interface-related first layer," and "the first interface-related second layer part carries out the processing of the first interface-related first layer messages." Ex. 1001, 15:48–55. For the first part of the claim, Petitioner contends that Posadas's "specific translations" between CAN protocol and SC data are a "conversion." Pet. 70–71 (citing Ex. 1007, 11; Ex. 1005 ¶ 291). Next, Petitioner points to Posadas's CAN protocol message frames as the first interface-related first layer messages that are received by the CAN network interface logic in the ISCCAN interface (i.e., the first interface-related first layer part). *Id.* at 71 (citing Ex. 1007, 10–11; Ex. 1005 ¶ 292). Finally, Petitioner contends that the ISCCAN interface includes logic (first interface-related second layer part) that processes raw CAN data (first interface-related first layer messages) by translating them to the SC format. *Id.* (citing Ex. 1007, 10–11; Ex. 1005 ¶ 293).

Patent Owner's argument in response is similar to that for claim 39—that "processing" takes place after distribution of the SC data, not within ISCCAN. PO Resp. 53. For reasons similar to those discussed above with

respect to claim 39, we agree with Petitioner that the ISCCAN translates CAN frames to SC data, thereby meeting the "conversion" requirement of claim 40.

We conclude that Petitioner shows by a preponderance of the evidence that claim 40 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

34. Claim 41

Claim 41 depends from claim 1 and requires "the message" to include a protocol data unit (PDU). Ex. 1001, 15:56–59. Rather than the specific first and second layer messages that must include protocol data units in claim 38, the "message" in claim 41 refers to "a message received utilizing a first network protocol associated with a first network" in claim 1, which is similar to limitation 51c in claim 51. *Id.* at 12:19–21. Petitioner cites Posadas's CAN frame received from the CAN network as disclosing the limitation in claim 41. Pet. 41 (citing Ex. 1007, 11; Ex. 1005 ¶ 295). We agree with Petitioner that a CAN frame includes data encapsulated in the CAN protocol, and thus is a "protocol data unit" under Petitioner's initial, and correct, interpretation of that term. Patent Owner does not address this claim specifically.

We conclude that Petitioner shows by a preponderance of the evidence that claim 41 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

35. Claim 42

Claim 42 depends from claim 1 and recites that "the computer program product is operable such that the message includes a header." Ex. 1001, 15:60–62. Petitioner refers back to its analysis for claim 54.

Pet. 72. We find that Petitioner makes an adequate showing that Posadas teaches CAN messages that include headers. *See* Ex. 1007, 10–11. Patent Owner does not address this claim.

We conclude that Petitioner shows by a preponderance of the evidence that claim 42 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

36. Claim 43

Claim 43 depends from claim 1 and recites that the computer program product is operable such that "the first interface-related first layer part is associated with a layer that is below another layer associated [with] the first interface-related second layer part." Ex. 1001, 15:65–67. With reference to its analysis of the independent claims, Petitioner identifies Posadas's ISCCAN logic that interfaces with the CAN network as the claimed "first layer part" and ISCCAN logic that translates raw CAN data to the SC format as the claimed "second layer part." Pet. 72–73. Petitioner contends that a person of ordinary skill in the art would have understood that the first layer part is associated with a relatively low level (i.e., layer) functionality—providing a communications interface with a standard CAN bus. *Id.* at 73 (citing Ex. 1005 ¶ 298). Petitioner further contends that a person of ordinary skill in the art would have understood that the second layer part is associated with a relatively higher layer functionality—translation of CAN data to SC format that can be understood by higher-level processes with access to memory. *Id.* (citing Ex. 1005 ¶ 298). Petitioner's reasoning, not separately disputed by Patent Owner, is consistent with the claim language and therefore persuasive.

We conclude that Petitioner shows by a preponderance of the evidence that claim 43 is unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense.

37. Claims 44 and 45

Claims 44 and 45 depend from claim 1 and respectively recite that the computer program product is operable such that the first interface-related second layer messages and the second interface-related first layer messages "have a same format" and "are [the] same messages." Ex. 1001, 16:1–10. For these limitations, Petitioner relies on its analysis of claims 52 and 53, which recite similar limitations. Pet. 73. Patent Owner does not address claims 44 and 45 in its Response.

For the same reasons discussed with respect to claims 52 and 53, we are persuaded that Posadas teaches the limitations in claims 44 and 45. Therefore, for the same reasons as for claims 52 and 53, we conclude that Petitioner shows by a preponderance of the evidence that claims 44 and 45 are unpatentable under 35 U.S.C. § 103(a) over the combination of Posadas, Stewart, and Wense,

F. Constitutionality of Inter Partes Review Proceedings

Patent Owner contends that "this IPR should be terminated and the petition dismissed because the IPR system is unconstitutional." PO Resp. 59. This argument is foreclosed by the Supreme Court's determination otherwise. *Oil States Energy Services, LLC v. Greene's Energy Group, LLC*, 138 S. Ct. 1365 (2018) ("In this case, we address whether inter partes review violates Article III or the Seventh Amendment of the Constitution. We hold that it violates neither.").

III. CONCLUSION

For the foregoing reasons, Petitioner demonstrates by a preponderance of the evidence that claims 2–29, 31–37, 39–46, and 52–58 of the '843 patent are unpatentable as obvious over the combination of Posadas, Stewart, and Wense; claims 30 and 59 of the '843 patent are unpatentable as obvious over the combination of Posadas, Stewart, Wense, and Zhao; and claims 52 and 53 of the '843 patent are unpatentable as obvious over the combination of Posadas, Stewart, Wense, and Upender. Petitioner does not demonstrate by a preponderance of the evidence that claim 38 of the '843 patent is unpatentable as obvious over the combination of Posadas, Stewart, and Wense.

III. ORDER

Accordingly, it is:

ORDERED that claims 2–37, 39–46, and 52–59 of U.S. Patent No. 8,566,843 B2 have been shown to be unpatentable;

FURTHER ORDERED that claim 38 of U.S. Patent No. 8,566,843 B2 has not been shown to be unpatentable; 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.

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