

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

STRAGENT, LLC,
Patent Owner.

Case IPR2017-01504
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 7 (“Dec.”). During the trial, Stragent, LLC (“Patent Owner”) filed a Response (Paper 10, “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, 40–46, and 52–59 are unpatentable, but does not show by a preponderance of the evidence that claims 38 and 39 are 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.

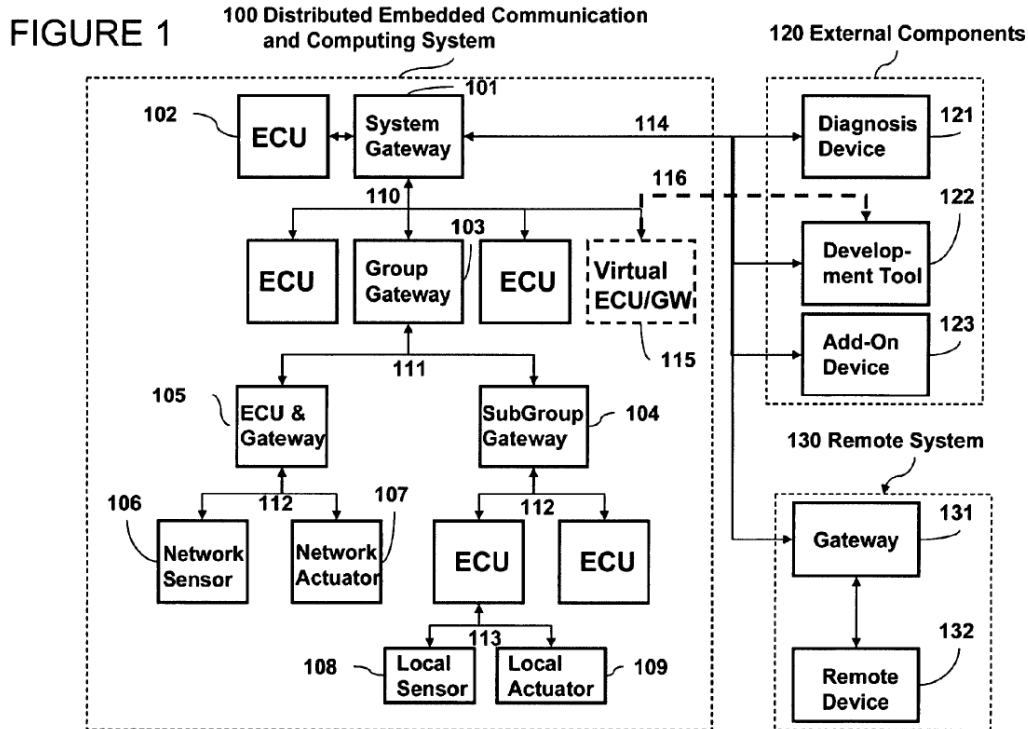


Figure 1 generally depicts elements of a distributed embedded communication and computing system. *Id.* at 3:9–11.

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.

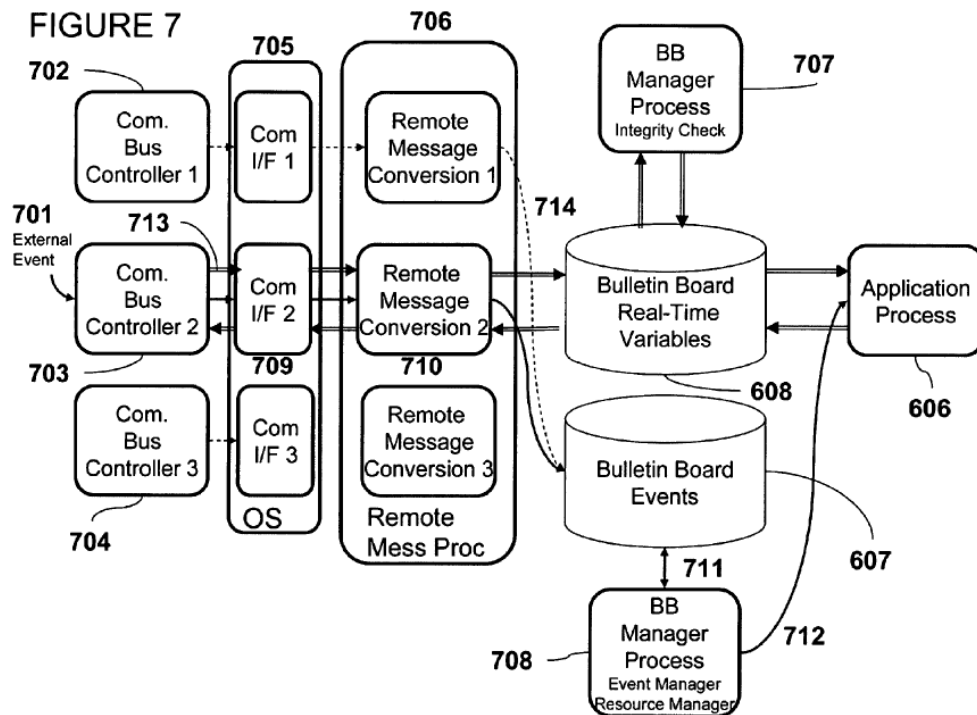


Figure 7 illustrates a system architecture in which a bulletin board acts as a shared memory interacting with multiple communication buses, with data received from one communication bus stored on the bulletin board and shared as a new message with other network types. *Id.* at 7:4–37.

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. 5, 13–39.

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. 8–12):

Miesterfeld, U.S. Patent No. 6,141,710, issued Oct. 31, 2000 (Ex. 1010, “Miesterfeld”);

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. Pohlmeier, 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
Miesterfeld, Stewart, and Wense	35 U.S.C. § 103(a)	2–29, 31–46, and 52–58
Miesterfeld, Stewart, Wense, and Zhao	35 U.S.C. § 103(a)	30 and 59
Miesterfeld, 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. 84. Patent Owner identifies only itself as a real party-in-interest. Paper 4, 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 3, 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 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

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.”).

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. 6; PO Resp. 13; 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. 12. 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.

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

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).

“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. 14.

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 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).

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

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 ¶ 48. 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. 14. 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. Miesterfeld

Miesterfeld discloses a system for interfacing a vehicle data bus (“VDB”) to an intelligent transportation system (“ITS”) data bus. Ex. 1010, 1:5–6. More particularly, Miesterfeld discloses a gateway including a shared memory that both the VDB and ITS data bus may access so that the data buses may exchange data. *Id.* at 1:7–10, Fig. 1. Miesterfeld’s system is shown, for example, in Figure 1, reproduced below:

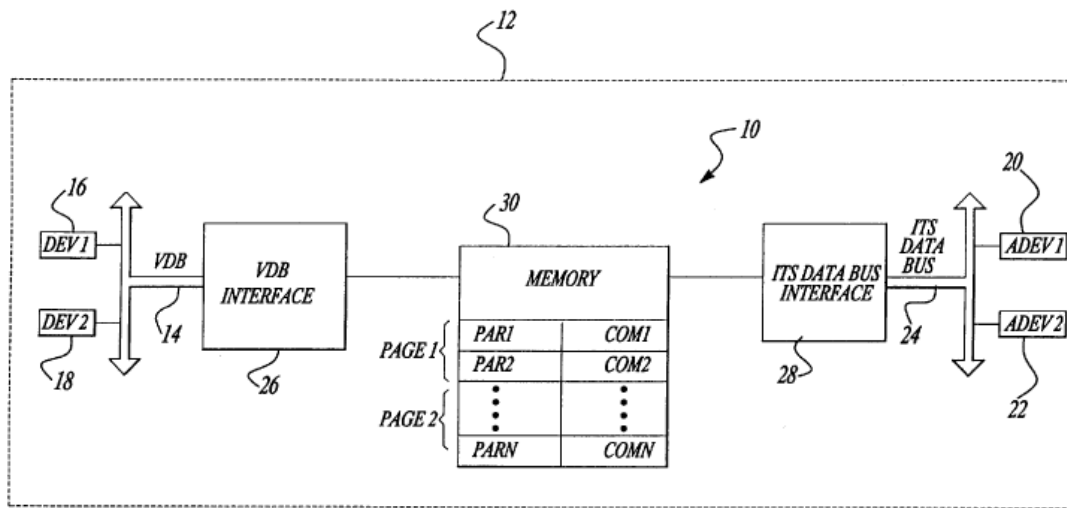


Fig-1

Figure 1 illustrates one embodiment of Miesterfeld’s gateway system. Vehicle 12 includes VDB 14, which provides a mechanism for data exchange among a plurality of connected devices (e.g., devices 16 and 18 in Figure 1), and ITS data bus 24, which provides a mechanism for data exchange among a plurality of connected devices (e.g., ancillary devices 20 and 22 in Figure 1). *Id.* at 3:1–17. VDB 14 and ITS data bus 24 can exchange data via VDB Interface 26 and ITS Data Bus Interface 28, each of which can read from or write to memory 30. *Id.* at 3:18–47. ITS data

bus 24 may be one of several different types of ITS data buses, such as “D²B, USB, IDB, Firewall [*sic*: FireWire], and the like.” *Id.* at 9:55–58. VDB 14 preferably implements the J1850 protocol. *Id.* at 4:6–10.

2. Stewart

Stewart discloses a framework for integrating real-time software control modules that comprise a reconfigurable multi-sensor based system. Ex. 1008, 6.⁵ 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

⁵ For the 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.

“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 Miesterfeld, Stewart, and Wense; claims 30 and 59 are unpatentable as obvious over the combination of Miesterfeld, Stewart, Wense, and Zhao; and claims 52 and 53 are unpatentable as obvious over the combination of Miesterfeld, Stewart, Wense, and Upender. Pet. 13–84. 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 Miesterfeld, Stewart, and Wense. *Daimler AG v. Stragent, LLC*, Case IPR2017-00457, slip op. at 31–43 (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. 13–39, 43–44. Likewise, many of Patent Owner’s responsive arguments are directed to claim 51 and are equally applicable to claim 1. PO Resp. 19–29, 32–33. 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 Miesterfeld 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. 13–16, 23–39. 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 Miesterfeld and Stewart. *Id.* at 16–23. 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 Miesterfeld’s gateway system for sharing information between a VDB bus and ITS bus in a vehicle is an “apparatus” comprising an electronic “control

unit” consisting of a VDB bus, an ITS data bus, and a gateway function that uses shared memory. Pet. 13–14 (citing Ex. 1010, 1:1–6, 2:23–24, Fig. 2); Ex. 1005 ¶¶ 115–120. 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 Miesterfeld’s ITS data bus and ancillary control devices connected to it as the “first network” and the protocol associated with the ITS data bus (e.g., IDB) as the claimed “first network protocol.” Pet. 14–15 (citing Ex. 1010, 3:23–25, 3:41–42, 3:56–57, 9:55–57, Fig. 1; Ex. 1005 ¶ 123). Petitioner also asserts that Miesterfeld’s system receives a message from the first network using the first network protocol and identifies information associated with the message when it stores incoming data in predetermined memory locations allocated for specific data or commands received from the ITS data bus to be transmitted to the VDB. *Id.* at 15–16 (citing Ex. 1010, 3:30–36, 4:32–37; Ex. 1005 ¶ 124). We agree with Petitioner’s analysis of this limitation, which Patent Owner does not dispute.

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 relies on Miesterfeld’s disclosure that before reading from or writing to shared memory (i.e., the claimed “storage resource,” shown in Figure 2 as

SPI RAM⁶), the ITS data bus first determines whether the shared memory is available by checking whether the SPI RAM Access Denied (SRAD) signal line is low (indicating the memory is available for writing) or high (indicating no unavailability). Pet. 16–17 (citing Ex. 1010, 6:33–40, Fig. 4 (step 122)). We find that Petitioner adequately identifies disclosure of this limitation, and Patent Owner does not dispute this aspect of Petitioner’s analysis.

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. 17–18 (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. 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. *Id.* 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.”

⁶ SPI RAM is an abbreviation for “serial peripheral interface random access memory.” Ex. 1001, 3:62–63.

Pet. 18, 22. We agree with Petitioner that Stewart teaches these limitations, which Patent Owner does not contest.

Petitioner contends that a person of ordinary skill in the art would have combined the teachings of Stewart with Miesterfeld for a variety of reasons. *Id.* at 18–22. For example, Petitioner asserts that both Miesterfeld and Stewart relate to real-time distributed computer control systems and both solve the problem of exchanging information between control modules by using a shared memory architecture. *Id.* at 18–19 (citing, e.g., Ex. 1010, [57], 1:13–16, 1:25–29, 3:15–49, 6:31–7:16; Ex. 1008, 6, 8, 11–12).

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 in designing a computer system that used memory would have been very familiar with.” *Id.* at 20 (citing Ex. 1005 ¶ 136). In addition, Petitioner contends that the combination of Miesterfeld 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 Miesterfeld’s shared memory. *Id.* (citing Ex. 1005 ¶ 137); *see also* Ex. 1005 ¶¶ 97–104 (Dr. Koopman explaining that retry and timeout mechanisms for arbitrating memory access, including the spin-lock technique with a “test and set” approach, were well known at the time of the ’843 patent).

Patent Owner argues that Petitioner’s analysis overlooks two points—
(i) Miesterfeld requires handshake lines, which allegedly are inconsistent

with Stewart, and (ii) Stewart and Miesterfeld disclose fundamentally different approaches to using a shared memory because Stewart comprises one network instead of two. PO Resp. 23 (citing Ex. 2006 ¶¶ 51–52). Patent Owner, however, does not explain why either Miesterfeld’s handshake lines or Stewart’s single network would prevent a person of ordinary skill in the art from applying Stewart’s well known memory access arbitration techniques to Miesterfeld’s shared memory. Nor does Dr. Miller provide any support for Patent Owner’s arguments, as his declaration simply repeats the brief statements in Patent Owner’s Response without further explanation or additional evidence. *See* Ex. 2006 ¶¶ 51–52. Thus, we are not persuaded by Patent Owner’s argument. Rather, we find Petitioner provides sufficient reasoning with rational underpinning for combining Stewart and Miesterfeld.

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. 22 (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. 24 (citing Ex. 2006 ¶ 55). According to Patent Owner, an error handler “does not necessarily or inherently include sending a notification.” *Id.* 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 ¶ 36). 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, Miesterfeld discloses that once SPI RAM (the storage resource) becomes available, the ITS data bus interface sets the SPI

RAM Access Required (SRAA) signal to high to notify the system that the SPI RAM will not be available, after which the ITS data bus interface stores data in the SPI RAM. Pet. 23 (citing Ex. 1010, 6:40–54). We agree with Petitioner that the cited disclosure in Miesterfeld teaches this limitation, which Patent Owner does not contest.

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 Miesterfeld discloses a second network (i.e., the VDB data bus and its interconnected devices) and a second network protocol (i.e., the VDB message format). Pet. 23. According to Petitioner, information is “shared” in Miesterfeld when the VDB interface determines whether the ITS data bus interface has written to the shared memory and then prepares a VDB message containing the information for transmission to the VDB. *Id.* at 24 (citing Ex. 1010, 7:63–8:3, 8:35–40; Ex. 1005 ¶¶ 147–148). Further, Petitioner asserts that information in Miesterfeld is shared in real-time because once the shared memory is available, the ITS data bus interface has five microseconds to notify the system it will be accessing the shared memory and then has five microseconds to write to the shared memory. *Id.* (citing Ex. 1010, 6:43–62).

Patent Owner disputes Petitioner’s analysis, arguing that “nothing in Miesterfeld states that VDB and ITS are different protocols, in part because VDB is not a recognized protocol.” PO Resp. 26. This argument is unpersuasive for at least two reasons. As discussed above, Patent Owner erroneously reads into claim 51 a requirement that the first network protocol

and second network protocol be different. *See supra* II.A.3 (construction of “the second network”). In addition, Miesterfeld provides that the VDB preferably implements J1850, which is a protocol. Ex. 1010, 4:6–10 (“Preferably, VDB 48, VDB transceiver 60, and VDB interface 62 are configured to implement the J1850 configuration as prescribed by the Society of Automotive Engineers (SAE) or any other industry standard as may be required.”); *see* Ex. 1005 ¶ 80 (describing details of the J1850 protocol)..

Patent Owner also argues that if “Miesterfeld had intended to communicate that VDB and ITS were different protocols, Miesterfeld would have to have disclosed a method of converting data from one protocol to another, but Miesterfeld did not do that.” PO Resp. 26. Therefore, Patent Owner contends, Miesterfeld does not disclose two different protocols. *Id.* We again are unpersuaded because claim 51 does not require two different protocols. Moreover, Miesterfeld discloses that the VDB is a J1850 bus, whereas the ITS data bus may be one of several types of buses, including IDB and USB. Ex. 1010, 9:55–58. Therefore, Patent Owner is simply incorrect that the two networks in Miesterfeld—the ITS data bus and its interconnected devices, and the VDB and its interconnected devices—do not use two different protocols.

For these reasons, we find that Petitioner sufficiently identifies limitation 51i as taught in the prior art, 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 Miesterfeld’s ITS data bus interface, which “enables data exchange between memory 30 and ITS data bus 24,” as the claimed “first interface,” and the ITS data bus and its interconnected devices as the claimed “first network.” Pet. 25 (citing Ex. 1010, 3:23–25). The ITS data bus interface includes a “first interface-related first component” connected to the ITS data bus that receives “first data units” (i.e., ITS data) and a “first interface-related second component” (i.e., the portion of the ITS data bus interface that accesses memory). *See id.* at 26–27. The first data units are “processed” for storage into memory, so that “processed first data units are provided,” as recited in the claim. *See id.* (citing Ex. 1010, 7:29–31).

Patent Owner states that it is “unlikely” that Miesterfeld discloses the entirety of these limitations but provides no evidence or argument in support of that position. *See* PO Resp. 27. Accordingly, Patent Owner’s argument is unpersuasive. Having reviewed Petitioner’s identifications and the reference itself, we determine that Miesterfeld sufficiently 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 asserts that Miesterfeld discloses an IDB bus as an example of a specific ITS data bus and that, “[b]y definition, IDB runs on CAN.” Pet. 27–28 (citing Ex. 1010, 9:55–58; Ex. 1005 ¶ 158). Petitioner relies on the declaration of Dr. Koopman, who testifies that a

person of ordinary skill in the art “would appreciate that a reference to the ITS Data Bus protocol refers to the SAE J2366 Family of ITS Data Bus (IDB) Protocol Standards,” which is based on CAN. Ex. 1005 ¶ 158 (citing Ex. 1032 (“The IDB is a serial communication bus, based on the industry standard for Controller Area Networks (CAN) that allows consumers to add or upgrade their devices over the lifetime of their vehicle.”)). In particular, the J2366 standard describes IDB-C, which is based on the CAN 2.0B specification. *Id.* (citing Ex. 1023 (SAE J2366-1) § 1, ¶ 3 (disclosing that the IDB physical layer “incorporates the CAN 2.0B specification per SAE J2284-2, with modifications”); Ex. 1024 (SAE J2366-2) § 3.11 (disclosing that “the Link Layer protocol for the IDB-C [is] a low speed network based on CAN 2.0B”)). Thus, in Petitioner’s view, the IDB bus disclosed as an ITS data bus in Miesterfeld is a Controller Area Network (CAN) bus as required by the claim limitation. Pet. 28.

According to Patent Owner, Miesterfeld’s reference to IDB does not teach a CAN bus:

As[] detailed in Dr. Miller’s declaration, Exh. 2006 ¶¶ 41–42, 66, a skilled artisan would understand that reference to “IDB” meant Standard J2355_199710, which was published October 1, 1997, and was the only known “IDB” when Miesterfeld was published. Contrary to Petitioner’s assertion, a skilled artisan would not understand that Miesterfeld was referring to “IDB-C,” which is a very different specification than “IDB,” and which was not even published until November 27, 2001 – long after Miesterfeld was published. *Id.* Miesterfeld never refers to CAN directly or indirectly, and a skilled artisan would not consider that Miesterfeld discloses combining the invention with the “IDB-C” standard merely because the standard includes the “IDB” in its title.

PO Resp. 28.

Petitioner presents two responsive arguments in its Reply. First, Petitioner argues that it is proper to consider the IDB-C standard described in J2366 because, even though J2366 was published after Miesterfeld,⁷ it was published before the earliest claimed priority date of the '843 patent (December 17, 2002). Pet. Reply 11–12. Because 35 U.S.C. § 103(a) looks to whether the claimed subject matter would have been obvious at the time the invention was made, Petitioner argues that a person of ordinary skill in the art would “have known to look to the IDB-C specification to determine how to implement the ITS bus disclosed in Miesterfeld.” *Id.* at 12.

Additionally, Petitioner contends that J2355, the earlier IDB specification introduced by Patent Owner, “expressly teaches the use of CAN,” as the Board previously found in the -457 IPR. Pet. Reply 12; *see* -457 Decision, slip op. at 37. Specifically, J2355 describes implementing the ITS data bus using “[e]xisting specifications such as the emerging SAE CAN Task Force Specification)[, which] may fit ITS requirements and will be considered during the standards development process.” Ex. 2002 § 5.1.4; *see* Pet. Reply 12. Notably, as Dr. Koopman explains, CAN is the only protocol mentioned in J2355 for use with the ITS data bus. Ex. 1037 ¶ 42. Moreover, J2355 refers to the then-forthcoming IDB-C specification (J2366): “Evolutionary changes to these requirements, the technical details of implementation, and performance specifications will be dealt with in SAE J2366 and related documents.” Ex. 2002 § 4.

⁷ SAE J2366-1 and SAE J2366-2 indicate they were issued in November 2001, whereas Miesterfeld was filed in 1998 and published in 2000. *See* Ex. 1023, 1; Ex. 1024, 1; Ex. 1010, at [22], [45].

We determine that Petitioner presents persuasive evidence that, contrary to Patent Owner's contention, J2355, the earlier ITS data bus (IDB) specification in existence at the time of Miesterfeld, sufficiently teaches that IDB can be implemented using CAN, so that a person of ordinary skill in the art would have understood Miesterfeld's example of IDB as a specific type of ITS data bus to refer to IDB using CAN. We also find that Petitioner's arguments and evidence regarding J2355 are properly responsive to Patent Owner's contention in its Response. Accordingly, we find that Miesterfeld teaches a first network that is of the CAN type, thereby satisfying the recited claim limitation.

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 Miesterfeld's VDB interface, which “enables the exchange of data between memory 30 and VDB 14,” as the claimed “second interface,” and the VDB and its interconnected devices as the claimed “second network.” Pet. 28 (citing Ex. 1010, 3:20–22). The VDB interface includes a “second interface-related first component” connected to the VDB that receives “second data units” (i.e., VDB data) and a “second interface-related second component” (i.e., the portion of the VDB interface that accesses memory). *See id.* at 28–29. The second data units are “processed” for storage into memory, so that “processed second data units are provided,” as recited in the claim. *See id.* at 29 (citing Ex. 1010, 4:11–

18). We agree with Petitioner's identifications, which Patent Owner does not specifically contest.

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. In Miesterfeld, the VDB (i.e., the second network) preferably implements “the J1850 configuration as prescribed by the Society of Automotive Engineers (SAE) or any other industry standard as may be required.” Ex. 1010, 4:6–10. Petitioner argues that a Local Interconnect Network (LIN) would have been an obvious replacement for Miesterfeld's J1850 network. Pet. 31 (citing Ex. 1010, 4:6–10, 9:60–63; Ex. 1005 ¶¶ 168–169). With support from Dr. Koopman, Petitioner asserts that LIN was well known before the effective filing date of the '843 patent and was known to work well in applications with a CAN network. *Id.* at 31–32 (citing Ex. 1005 ¶ 169).

Petitioner cites Wense as a particular use of LIN and CAN together in an automotive environment. *Id.* at 32 (citing Ex. 1009). Specifically, Wense describes the use of LIN in the same hierarchical network as CAN. Ex. 1009, 13, Fig. 3. As Petitioner asserts, Wense also discloses LIN as a comparable alternative to a J1850 network in terms of cost-effectiveness, data rate, and type of application. Pet. 32–33 (citing Ex. 1009, Fig. 1).

Petitioner contends that a person of ordinary skill in the art would have combined the teachings of Wense with Miesterfeld for a variety of reasons. *Id.* at 34–39. For example, Petitioner asserts that Miesterfeld and Wense are in the same field of endeavor (distributed systems in a multiplex networking environment specifically for automotive electronic systems) and

are concerned with integrating communications among hybrid electronic control modules and networks. *Id.* at 34–36. 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 36 (citing Ex. 1009, 11). Further, Petitioner points out that Figure 1 of Wense illustrates that both LIN and J1850 are cost-effective compared to other protocols and suitable for low data rate applications, with LIN being slightly more cost-effective. *Id.* at 37–38 (citing Ex. 1009, 11, Fig. 1). In view of these explicit teachings in Wense, replacing the J1850 VDB in Miesterfeld with a LIN network as taught in Wense would have been a simple substitution and a predictable combination. *See id.* at 36–37.

Patent Owner does not dispute Petitioner’s analysis of this limitation or its rationale for combining Wense with Miesterfeld and Stewart.⁸ For the reasons set forth in the Petition, exemplified by the discussion above, we

⁸ Patent Owner does not challenge Petitioner’s asserted rationale for combining Wense with Miesterfeld and Stewart in its arguments for claim 51. *See* PO Resp. 19–29. For claim 1, however, as well as most of the dependent claims it addresses, Patent Owner states in conclusory fashion that the combination of Miesterfeld, Stewart, and Wense does not disclose every claim limitation, “nor would a person of ordinary skill in the art have been motivated to combine them to arrive at the invention of the ‘843 Patent.” *E.g.*, PO Resp. 30 (claims 52 and 53), 32 (claim 58), 33 (claim 1), 34 (claim 2). Although Patent Owner cites Dr. Miller’s declaration for support, he does not provide any analysis in support of the statement with respect to Wense. *E.g.*, Ex. 2006 ¶¶ 71, 73, 75, 77. Accordingly, Patent Owner does not argue persuasively with respect to any claim that a person of ordinary skill in the art would not have combined Wense with Miesterfeld and Stewart.

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 Miesterfeld, as modified by Stewart. *See* Pet. 34–39.

Summary

Petitioner adequately shows that the combination of Miesterfeld, 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 43. As for the differences, Petitioner relies on Miesterfeld 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.* (citing Ex. 1010, 2:56–57, 2:61–62, Figs. 4, 6). 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 Miesterfeld discloses allowing receipt of information, specifically describing how an ITS data bus interface “enables data exchange between memory 30 and ITS data bus 24,” the interconnected ancillary devices exchange data via the ITS data bus, and the ITS data bus interface stores received data in memory. Pet. 43 (citing Ex. 1010, 3:23–25, 3:56–57, 3:41–42). Petitioner otherwise relies on its analysis with respect to claim 51. *Id.* at 43–44.

Patent Owner presents no separate arguments directed to claim 1. *See* PO Resp. 32–33. 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 Miesterfeld, 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 ¶ 48. 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 13. 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 ¶¶ 48–49).

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. 30. Thus, according to Patent Owner, the claims require the processed first data units and the second data units, which are “*at two different levels (first interface-related second component vs. second interface-related first component)*,” to be the same or share the same format. *Id.* (emphasis modified). 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 ¶ 70.

We are persuaded that Petitioner’s argument is better supported by the record than Patent Owner’s. Patent Owner essentially 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 14. 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.* 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.* (citing Ex. 1001, 1:29–33, 3:46–

59, 6:47–57, 7:4–15, 8:13–63, 11:66–12:3; Ex. 1042 ¶ 51). 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 Miesterfeld teaches the limitations in claims 52 and 53. *See* Pet. 40. Specifically, first data units from the ITS data bus that are posted to memory after processing by the ITS data bus interface (i.e., the claimed first interface) are the same data units and have the same format as the second data units on the VDB. *See id.* (citing Ex. 1010, 7:63–8:3, 8:35–40, Fig. 2); *see* Ex. 1005 ¶ 186.

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 Miesterfeld, Stewart, and Wense. Pet. 79–84. 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 80–81 (citing Ex. 1038, 2:17–23, 2:34–37, 2:45–50, 3:1–8, 4:51–5:26, 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 Miesterfeld.

PO Resp. 58. 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. 81–84; *see* Ex. 1005 ¶¶ 355–362. For example, Petitioner asserts that both “relate to real-time distributed computer control systems with a shared memory architecture.” Pet. 82 (citing Ex. 1005 ¶ 356; Ex. 1010, Abstract, 3:15–49, 6:31–7:16; Ex. 1038, Abstract, 1:35–48). Also, combining the teachings of Upender with Meisterfeld 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 83 (citing Ex. 1005 ¶ 359). We note that claims 52 and 53, which depend from claim 51, do not require the two networks to be of different types. Patent Owner argues only that Miesterfeld does not disclose CAN, but as discussed with respect to claim 51, we find that Miesterfeld’s example of IDB as a particular type of ITS data bus teaches CAN. Having considered the parties’ arguments and evidence, we determine that Petitioner provides sufficient reasoning with rational underpinning for combining Upender with Miesterfeld, 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 Miesterfeld, Stewart, and Wense, and that claims 52 and 53 also are unpatentable under 35 U.S.C. § 103(a) over the combination of Miesterfeld, 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 Miesterfeld of network protocols, such as CAN, that include network headers. Pet. 40–41 (citing Ex. 1010, 9:55–57, 4:32–37, 7:17–27; Ex. 1005 ¶ 190; Ex. 1019, 7, Fig. 7 (CAN message with header)). 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 Miesterfeld, 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. Referring back to its analysis for claim 51, Petitioner asserts that Miesterfeld’s ITS data bus with interconnected devices and VDB with interconnected devices are two, heterogeneous networks. 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 Miesterfeld, 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 back to its analysis for

claim 51, Petitioner asserts that Miesterfeld discloses two different network protocols—CAN and J1850. Pet. 41. 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 Miesterfeld, 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 Miesterfeld discloses an ITS data bus (e.g., IDB, also known as CAN-C), which has a rate of between 125 kbps and 1 Mbps, and J1850, which has a rate of up to just over 20 kbps. Pet. 41–42 (citing Ex. 1005 ¶ 196). For confirmation, Petitioner refers to Figure 1 of Wense, which illustrates the speeds of various networks used in automotive applications. *Id.* at 42; Ex. 1009, Fig. 1.

According to Patent Owner, this argument fails because Miesterfeld does not disclose CAN. PO Resp. 31. Patent Owner’s argument is not persuasive because, as previously discussed, we determine that Miesterfeld teaches a network using IDB, which a person of ordinary skill in the art would have understood to be CAN.

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 Miesterfeld, 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 Miesterfeld discloses the use of CAN and J1850, which are different protocols and use different message formats, such that Miesterfeld’s processing of messages, as discussed above with respect to claim limitations 51i–51o, meets the limitations of claim 58. Pet. 42 (citing Ex. 1005 ¶ 199). Patent Owner responds with the same unpersuasive argument regarding Miesterfeld’s disclosure of CAN. PO Resp. 32. We find that Petitioner makes a sufficient showing with respect to this claim.

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 Miesterfeld, 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 Miesterfeld for teaching the first and second networks and protocols. As for the third network and protocol, Petitioner contends that adding a third network to Miesterfeld was well within the level of ordinary skill and would have been a “minor, and trivial design choice.” Pet. 75. Petitioner cites Zhao as an example of one of “many references disclosing three networks.” *Id.* (citing Ex. 1039). According to Petitioner, Zhao explicitly explains that the disclosed network topology includes more than two networks. *Id.* at 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 Miesterfeld’s teachings. *Id.* at 76–78. For instance, Petitioner alleges that Miesterfeld’s disclosure that its system can use “any of a number of ITS data buses, such as D²B, USB, IDB, Firewall [*sic*: FireWire], and the like, with no additional circuitry” would have suggested to a person of ordinary skill in the art that “Miesterfeld could readily be used with more than two networks.” *Id.* at 76–77 (citing Ex. 1010, 9:53–57; Ex. 1005 ¶ 340). Further, Petitioner asserts that Miesterfeld and Zhao are in the same field of network communications, Zhao’s shared database environment is similar to Miesterfeld’s shared memory architecture, and “[m]odifying Miesterfeld to include one of the well-known networks described in Zhao (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 77–78 (citing Ex. 1039 ¶¶ 28, 62; Ex. 1005 ¶¶ 341–344).

Patent Owner challenges Petitioner’s rationale for combining Zhao with Miesterfeld. PO Resp. 54–56. Specifically, Patent Owner contends that “Miesterfeld 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 55. 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 26 (citing Ex. 1039 ¶¶ 60–61, 63–64, 74; Ex. 1042 ¶ 76). We are persuaded that Zhao and Miesterfeld 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 Miesterfeld 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 Miesterfeld, 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. 44–45 (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.* at 45 (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 Miesterfeld. PO Resp. 34. 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 Miesterfeld, 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.

For the claimed “bulletin board,” Petitioner identifies a shared memory in Miesterfeld that uses what it refers to as “mailboxes.” Pet. 45; Ex. 1010, 3:26–28. Preferably, Miesterfeld’s memory is allocated so that each vehicle parameter and each command is assigned a particular mailbox (i.e., a predetermined section of memory), and only that parameter or command can be placed in the mailbox (i.e., memory location). Ex. 1010, 3:26–36. Further, mailboxes can be grouped into pages for subject-specific data, “such as manufacturer specific data, engine related data, transmission

related data, and the like.” *Id.* at 3:36–39. The memory is accessible to both the VDB interface and the ITS data bus interface so that each interface will be able to read from or write to memory. *Id.* at 3:41–43.

Patent Owner contends that “Miesterfeld’s shared memory ‘mailboxes’ are distinguishable from the bulletin board required by claim [3] because the ‘mailboxes’ are incapable of accommodating ‘electronic messages, files, and/or other data that are of general interest and/or addressed to no particular person/process.’” PO Resp. 34. This is so, Patent Owner argues, because “Miesterfeld’s ‘mailboxes’ store exclusively predetermined content and lack the generality and flexibility of a bulletin board.” *Id.* at 34–35.

Patent Owner’s argument is not persuasive, even under its construction based on the description in the ’843 patent of a “bulletin board” as a “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.” Ex. 1001, 5:9–13. First, Patent Owner does not dispute that Miesterfeld’s VDB interface and ITS data bus interface both can read data from and write data to the shared memory, which thus “enables users to send and/or read electronic messages, files, and/or data.” Instead, Patent Owner’s argument is directed to the alleged requirement that data stored on the bulletin board be “of general interest and/or addressed to no particular person/process.” PO Resp. 34. In Patent Owner’s view, Miesterfeld’s shared memory cannot satisfy this condition because the mailboxes “store exclusively predetermined content and lack the generality and flexibility of a bulletin board.” *Id.* at 35.

For at least the reasons set forth in the Reply, we disagree with Patent Owner. *See* Pet. Reply 15–18. Miesterfeld discloses that data are stored in memory without being addressed to a particular person or process.

Petitioner cites Figure 5 of Miesterfeld, which shows the shared memory—SPI RAM—as storing data that may be obtained by any process on either the ITS data bus or the VDB. *Id.* at 15–16 (citing Ex. 1010, 7:29–40, Fig. 5; Ex. 1042 ¶ 54). Notably, Patent Owner’s declarant, Dr. Miller, confirms on cross-examination that Figure 5 of Miesterfeld includes no destination address for any data stored in memory. Ex. 1043, 87:20–25; *see* Pet. Reply 16. Under Patent Owner’s proposed meaning of “bulletin board” taken from the written description of the ’843 patent, it is sufficient for Miesterfeld’s memory to store data not addressed to a particular person or process; it need not also store data of general interest. Ex. 1001, 5:9–13 (“electronic messages, files, and/or other data that are of general interest *and/or* addressed to no particular person/process”) (emphasis added).

Furthermore, Patent Owner is incorrect that Miesterfeld’s shared memory stores only “predetermined content.” *See* Pet. Reply 17. Miesterfeld describes the use of “predetermined” memory locations or sections to store, for example, “predetermined vehicle parameters” such as manufacturer data, engine data or transmission data. Ex. 1010, 3:26–39. These are the types of system variable data that are stored on a bulletin board in the ’843 patent. *See* Ex. 1001, 6:22–32. Moreover, Miesterfeld’s reference to predetermined memory locations simply describes how data are organized in memory, without limiting the types of data that can be stored or how they are addressed. *See* Pet. Reply 17. The claim language does not preclude placing data in particular sections of memory. *See id.*

For these reasons, we are persuaded by Petitioner that Miesterfeld discloses a bulletin board as a storage resource, notwithstanding Patent Owner's arguments to the contrary. Therefore, 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 Miesterfeld, Stewart, and Wense.

12. Claims 4–6

Claims 4–6 each 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 Miesterfeld discloses these limitations for the same reasons discussed in connection with claim 3. *See* Pet. 46–47. Patent Owner does not contest Petitioner's showing for claim 4 and repeats its unpersuasive arguments regarding Miesterfeld's “mailboxes” with respect to claims 5 and 6.

For the reasons discussed with respect to claim 3, 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 Miesterfeld, 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. Petitioner contends that Miesterfeld's mailboxes are “sections” of storage as required by claim 7 and that Miesterfeld's shared memory with mailboxes

qualifies as a database because it is an organized area of memory for storing information. Pet. 47–48. We agree with Petitioner’s contentions, which Patent Owner does not dispute.

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 Miesterfeld, Stewart, and Wense.

14. Claims 9, 10, and 12

Claims 9, 10, and 12 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,” and “another storage resource request.” Ex. 1001, 13:25–30, 13:36–39. Petitioner relies on Miesterfeld, particularly Figure 4, for teaching these limitations. Pet. 48–51 (citing Ex. 1010, Fig. 4). When Miesterfeld’s ITS data bus attempts to access RAM, it first checks the SRAD signal line to determine if memory is available. Ex. 1010, 6:31–36. We agree with Petitioner that checking the SRAD signal is a request for a storage resource (i.e., RAM) as recited in claim 10. If SRAD is low, the ITS data bus interface may write to the memory, but must set the SRAD signal high within five microseconds. *Id.* at 6:33–45. If it fails to do so, it must “retest the SRAD input again before attempting to access” RAM. *Id.* at 6:46–49. We agree with Petitioner that this “retest” is a “re-request” and “another storage resource request” as respectively recited in claims 9 and 12. Patent Owner does not dispute Petitioner’s analysis of these claims.

We conclude that Petitioner shows by a preponderance of the evidence that claims 9, 10, and 12 are unpatentable under 35 U.S.C. § 103(a) over the combination of Miesterfeld, Stewart, and Wense.

15. Claim 11

Claim 11 depends from claim 1 and recites that “the computer program product is operable such that the request is repeated until the storage resource is available unless a certain time beyond the threshold has elapsed.” Ex. 1001, 13:32–35. Similarly to limitations 51e and 51f of claim 51, discussed above, Petitioner relies on Stewart’s disclosure of 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. Pet. 50 (citing Ex. 1008, 11). Stewart also describes a “time-out period,” for retries, after which the task will not perform memory storage. Ex. 1008, 11. Patent Owner repeats its unpersuasive argument that a person of ordinary skill in the art would not have combined Stewart with Miesterfeld. PO Resp. 37. We find that Petitioner identifies sufficient disclosure in Stewart to teach or at least suggest the recited limitation.

We conclude that Petitioner shows by a preponderance of the evidence that claim 11 is unpatentable under 35 U.S.C. § 103(a) over the combination of Miesterfeld, Stewart, and Wense.

16. Claim 13

Claim 13 depends from claim 1 and recites that “the computer program product is operable such that the request is for access to the storage resource.” Ex. 1001, 13:49–53. For this limitation, Petitioner relies on Stewart’s spin-lock with 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 for concurrent writes from other processes. Pet. 51; see Ex. 1008, 11. Patent

Owner repeats its unpersuasive argument that a person of ordinary skill in the art would not have combined Stewart with Miesterfeld. PO Resp. 37. We find that Petitioner makes a sufficient showing with respect to this limitation.

We conclude that Petitioner shows by a preponderance of the evidence that claim 13 is unpatentable under 35 U.S.C. § 103(a) over the combination of Miesterfeld, Stewart, and Wense.

17. 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. 52 (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.* at 52–53 (citing Ex. 1005 ¶ 249). 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 53; *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. 38. 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 20 (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 19. 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 ¶ 63.

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 Miesterfeld, Stewart, and Wense.

18. 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 Miesterfeld’s ITS data bus interface, for example, which reads information from shared memory. Pet. 53. In reply to Patent Owner’s argument that the ITS data bus interface is a “single hardware element,” Petitioner further explains that the IDB bus interface transmits information to a plurality of recipients on the bus, such as devices 20 and 22, shown in Figure 1. PO Resp. 39; Pet. Reply 20–21 (citing Ex. 1010, 2:66–3:16, Fig. 1). We agree with Petitioner that the identified disclosure in Miesterfeld teaches or at least suggests providing information to a plurality of software or hardware operations.

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 Miesterfeld, Stewart, and Wense.

19. 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. We agree with

Petitioner that Miesterfeld expressly discloses an electronic control module with a gateway function. *See* Pet. 54; Ex. 1010, 1:6–11 (describing invention as “a gateway for interfacing a vehicle data bus to an intelligent transportation system data bus, and more particularly, a gateway including a memory which the vehicle data bus and the intelligent transportation system data bus may each access in order to exchange data between the respective buses”). Ex. 1010, 1:6–11. Patent Owner does not dispute this showing.

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 Miesterfeld, Stewart, and Wense.

20. 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 Miesterfeld’s disclosure that once the shared memory is available, the ITS data bus interface has five microseconds to notify the system it will be accessing the shared memory and then has five microseconds to write to the shared memory. Pet. 54–55 (citing Ex. 1010, 6:43–62). Petitioner also contends that Miesterfeld’s VDB interface is expected to transmit any data received from the ITS data bus within forty milliseconds. *Id.* at 55 (citing Ex. 8:51–56); *see* Ex. 1005 ¶ 263. As these times are less than one second, Petitioner adequately shows, consistent with our adopted construction of “real-time,” that Miesterfeld 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 Miesterfeld, Stewart, and Wense.

21. 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. Petitioner addresses this limitation with Miesterfeld’s disclosure of IDB as an example of a specific ITS data bus, and the contention that IDB is a CAN bus. Pet. 55 (citing Ex. 1005 ¶ 266). Patent Owner contends that Miesterfeld does not disclose CAN. PO Resp. 39. This argument is unpersuasive for the reasons discussed previously.

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 Miesterfeld, Stewart, and Wense.

22. 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. 56–57. 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 56 (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.* at 56–57 (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 Miesterfeld.” PO Resp. 40. 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). Patent Owner also contends that “because Miesterfeld does not disclose CAN, and Wense is offered only to disclose combinations of LIN or Flexray with CAN, there is no basis for combining Wense with Miesterfeld.” *Id.* (emphasis omitted). Patent Owner’s contention that Miesterfeld does not disclose CAN is unpersuasive for the reasons discussed previously.

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 Miesterfeld to include a FlexRay network or LIN in place of the J1850 network. *See* Pet. 57 (citing Ex. 1005 ¶¶ 270–272). 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 Miesterfeld, Stewart, and Wense.

23. 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 Miesterfeld discussed above in connection with limitation 51k, for example, with respect to the first interface-related first and second layer parts. Pet. 57–61.

Patent Owner disagrees with Petitioner’s analysis, specifically arguing that the “second layer” parts of both the first interface (i.e., the ITS data bus interface) and the second interface (i.e., the VDB interface) are not “communication interfaces” because they are not associated with communication networks. PO Resp. 42 (citing Ex. 2006 ¶ 101). As Petitioner notes, however, Miesterfeld discloses that the ITS data bus interface and the VDB interface communicate with SPI RAM via the SPI bus. Pet. Reply 21 (citing Ex. 1010, 3:59–67, Fig. 2). Further, Stragent’s own declarant, Dr. Miller, agrees in deposition testimony that the VDB interface is a “communication interface” that interfaces with the SPI bus. Ex. 1043, 78:15–79:12. Thus, we are persuaded that Miesterfeld discloses the recited limitations.

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 Miesterfeld, Stewart, and Wense.

24. 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. We agree with Petitioner that Figure 1 of Miesterfeld shows the ITS data bus interface and the VDB interface as separate portions of the same gateway apparatus. Pet. 62–63 (citing Ex. 1010, Fig. 1; Ex. 1005 ¶ 283). 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 Miesterfeld, Stewart, and Wense.

25. *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 responds with the same unpersuasive argument regarding Miesterfeld’s disclosure of CAN. Pet. 63–65; PO Resp. 42–44. 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 Miesterfeld, Stewart, and Wense.

26. *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 Miesterfeld, Stewart, Wense, and Zhao.

27. *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. 66. 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. 45.

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 μ sec 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 22; 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 Miesterfeld, Stewart, and Wense.

28. 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. According to Petitioner, the ’843 patent describes this limitation in connection with Figure 12: “Referring to FIG. 12, the application process (1200) utilizes the bulletin board retrieve mechanism (1101) to access all parameters, events, and real-time variables from the bulletin board. Thus the application is decoupled from the temporal behavior of the input/output variables and can be triggered by a plurality of events.” Pet. 66 (quoting Ex. 1001, 8:64–9:2). Patent Owner does not dispute that “isolated from temporal characteristics” as claimed means that a process is decoupled from temporal behavior as described in the quoted passage. *See* PO Resp. 45–46.

Petitioner contends that Miesterfeld teaches this limitation. Specifically, Petitioner cites Miesterfeld’s disclosure of the ITS data bus interface and VDB interface writing to and reading from memory. Pet. 66–67; Pet. Reply 23–24. As a particular example, Petitioner cites Miesterfeld’s description of two criteria that are used to determine when to attempt to

transmit a message to the VDB. Pet. Reply 23–24 (citing Ex. 1010, 8:38–60). First, the VDB interface will only attempt to initiate a transmission onto the VDB after forty milliseconds have passed since the last successful transmission was initiated. Ex. 1010, 8:53–56. Second, the VDB interface waits until the VDB is idle before transmitting the message onto the VDB. *Id.* at 56–58. The cross-examination testimony of Patent Owner’s declarant, Dr. Miller, supports Petitioner’s position that this disclosure in Miesterfeld describes processes temporally isolated from the networks. See Ex. 1043, 80:8–81:24 (“Q: . . . the writing to the VDB bus does not take into account the speed of the network, whatever that may be? A: Yeah. . . . Q: And it also likewise doesn’t take into account the rate of the ITS bus, whatever that may be, right? A: Yeah, I would agree with that.”); Pet. Reply 23.

We disagree with Patent Owner’s contention that Petitioner only describes Miesterfeld’s mailbox memory as temporally isolated. See PO Resp. 46. Rather, we find that Petitioner’s argument, discussed above, sufficiently identifies disclosure in Miesterfeld teaching or suggesting 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 Miesterfeld, Stewart, and Wense.

29. *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 identifies Miesterfeld’s use of an HIP7030A2 processor for the VDB interface to process VDB messages. Pet. 67 (citing Ex. 1010, 5:1–3).

In accordance with the datasheet for this processor, Dr. Koopman testifies that the “HIP processor responds to interrupts to receive data, in this case from the VDB network, then transfers information to the SPI RAM responsive to the end of an incoming message having been received.”

Ex. 1005 ¶ 303 (citing Ex. 1036, 1, 11–13); *see* Pet. 67. We are persuaded by Petitioner’s analysis, which Patent Owner does not contest.

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 Miesterfeld, Stewart, and Wense.

30. *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 Miesterfeld’s disclosure of two different networks—CAN and J1850—which operate at different rates. Pet. 68 (citing Ex. 1005 ¶ 306). According to Petitioner, the two networks access Miesterfeld’s shared memory at different rates, and the two networks are updated at different rates. *Id.*

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, Petitioner does not point to any process in Miesterfeld located in a given domain (CAN or J1850) 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 24.

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 Miesterfeld of two networks accessing memory and operating at different rates is sufficient.

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 Miesterfeld, Stewart, and Wense.

31. 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 Miesterfeld, “data is removed from CAN messages and placed into the bulletin board without reference to any destination information external to the CAN network as would be required by an OSI Network Layer.” Pet. 69 (citing Ex. 1010, 3:25–49).

Dr. Koopman also testifies, with supporting evidence, that CAN does not use a Network Layer. Ex. 1005 ¶ 309. Petitioner sufficiently shows that Miesterfeld 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 Miesterfeld, Stewart, and Wense.

32. 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. 69–70, 73–74 (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 Miesterfeld. See PO Resp. 48–49, 53–54.

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 Miesterfeld, Stewart, and Wense.

33. *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. 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. Petitioner and Dr. Koopman assert that protocol data units “are values contained in the message payload,” i.e., the data or information being transmitted. Pet. 70–71 (Ex. 1005 ¶ 317). For support, they cite the description of *packet* data units in the ’843 patent discussed above in connection with claims 52 and 53, without explaining why the two terms are interchangeable. *Id.* (citing Ex. 1001, 6:50–51); Ex. 1005 ¶ 317 (citing Ex. 1001, 6:50–51). Under a standard technical definition, however, a “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). Dr. Miller also makes a 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 its analysis of claim 38, Petitioner asserts that “[b]oth CAN and J1850 contain data payloads, and M[i]esterfeld uses the payload information from those network frames to receive and send commands.” Pet. 71 (citing Ex. 1010, 4:30–31, 4:36–37). Petitioner contends that the information

processed by the VDB interface and stored in memory in Miesterfeld corresponds to the “second interface-related second layer messages.” *Id.* at 70. Petitioner does not specifically identify where Miesterfeld teaches the “first interface-related second layer messages,” but we assume Petitioner intends to point to the information processed by the IDB (CAN) and stored in memory. *See id.* Elsewhere, Petitioner argues that processing removes header and routing overhead data. *E.g.*, Pet. Reply 13–14.

In view of the customary meaning of “protocol data unit” and Dr. Miller’s testimony, and Petitioner’s failure to explain why the claimed “protocol data unit” is equivalent to a packet data unit stripped of headers, we do not find Petitioner’s identification of processed IDB data and VDB data sufficient to show that Miesterfeld teaches first interface-related second layer messages and second interface-related second layer messages that include protocol data units, as required by claim 38. Accordingly, 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 Miesterfeld, Stewart, and Wense.

34. 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 contends that Miesterfeld discloses heterogeneous networks that read and write to the same shared memory and that, as discussed in connection with claim 51o, those networks may be CAN and J1850, which have different headers. Pet. 71. The problem with Petitioner’s position is that the messages that must be different

in terms of headers in the claim are both associated with the first interface, and therefore with the same first network, e.g., CAN. Thus, with its reference to different CAN and J1850 headers, Petitioner fails to show that the combined references teach the recited limitation. Accordingly, we conclude that Petitioner does not show by a preponderance of the evidence that claim 39 is unpatentable under 35 U.S.C. § 103(a) over the combination of Miesterfeld, Stewart, and Wense.

35. 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. Petitioner contends that Miesterfeld discloses these limitations for the reasons discussed in connection with limitations 51k–51n. Pet. 71. Patent Owner does not dispute Petitioner’s contentions. We agree with Petitioner that the earlier analysis demonstrates that Miesterfeld discloses these limitations.

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 Miesterfeld, Stewart, and Wense.

36. 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. For that limitation, Petitioner cites Miesterfeld’s disclosure of a message received from the ITS data bus in a CAN format. Pet. 15. Patent Owner responds with the same unpersuasive argument regarding Miesterfeld’s disclosure of CAN. PO Resp. 51. Because a CAN message includes data related to the CAN protocol, i.e., a CAN protocol data unit, Petitioner makes a sufficient showing by relying on Miesterfeld for teaching the limitation of claim 41. *See* Pet. 72.

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 Miesterfeld, Stewart, and Wense.

37. 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 Miesterfeld teaches CAN messages that include headers. *See* Ex. 1010, 9:55–57; Ex. 1019, 7, Fig. 7 (CAN message with header). 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 Miesterfeld, Stewart, and Wense.

38. 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 logic in Miesterfeld’s ITS data bus interface for interfacing with the ITS data bus as the claimed “first layer part” and logic in the ITS data bus interface that processes ITS data for storage in memory as the claimed “second layer part.” Pet. 72. 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 ITS data bus. *Id.* (citing Ex. 1005 ¶ 329). 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 ITS data to a format that can be understood by higher-level processes with access to memory. *Id.* at 72–73 (citing Ex. 1005 ¶ 329). 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 Miesterfeld, Stewart, and Wense.

39. *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, in turn, repeats the same arguments in response. PO Resp. 52–53. As with claims 52 and 53,

Patent Owner essentially 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 24.

For the same reasons discussed with respect to claims 52 and 53, we are persuaded that Miesterfeld teaches the limitations in claims 44 and 45. Although claims 44 and 45 refer to “messages” instead of “data units,” Petitioner persuasively argues that the ’843 patent “is replete with disclosure clearly indicating that ‘messages’ are [simply] data,” and thus treats them the same as “data units” in claims 52 and 53. Pet. Reply 25 n.19 (citing Ex. 1001, 13:9–17 (claims 5 and 6 stating that “messages” are stored in the storage resource), Fig. 15 (referring to storage of “messages” in the bulletin board)).

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 Miesterfeld, 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, 40–46, and 52–58 of the '843 patent are unpatentable as obvious over the combination of Miesterfeld, Stewart, and Wense; claims 30 and 59 of the '843 patent are unpatentable as obvious over the combination of Miesterfeld, Stewart, Wense, and Zhao; and claims 52 and 53 of the '843 patent are unpatentable as obvious over the combination of Miesterfeld, Stewart, Wense, and Upender. Petitioner does not demonstrate by a preponderance of the evidence that claims 38 and 39 of the '843 patent are unpatentable as obvious over the combination of Miesterfeld, Stewart, and Wense.

III. ORDER

Accordingly, it is:

ORDERED that claims 2–37, 40–46, and 52–59 of U.S. Patent No. 8,566,843 B2 have been shown to be unpatentable;

FURTHER ORDERED that claims 38 and 39 of U.S. Patent No. 8,566,843 B2 have 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.

IPR2017-01504
Patent 8,566,843 B2

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