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Paper 32
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BMW OF NORTH AMERICA, LLC,
Petitioner,

v.

STRAGENT, LLC,
Patent Owner.

Case IPR2017-01522
Patent 8,209,705 B2

Before LYNNE E. PETTIGREW, PATRICK M. BOUCHER, and CHRISTA P. ZADO, *Administrative Patent Judges*.

BOUCHER, *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 BMW of North America, LLC ("Petitioner"), we instituted an *inter partes* review of claims 7–14 and 16–19 of U.S. Patent No. 8,209,705 B2 ("the '705 patent"). Paper 7 ("Dec."); Paper 18. During the trial, Stragent, LLC ("Patent Owner") filed a Response (Paper 10, "PO Resp.") to which Petitioner filed a Reply (Paper 25, "Reply"). An oral hearing was held with the parties, and a copy of the transcript was entered into the record. Paper 31 ("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 has shown, by a preponderance of the evidence, that claims 7–14 and 16–19 are unpatentable.

I. BACKGROUND

A. The '705 Patent

The '705 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 '705 patent, which is reproduced below.

[1] The hearing was a consolidated hearing for IPR2017-01519, IPR2017-01520, IPR2017-01521, and IPR2017-01522.

FIGURE 1

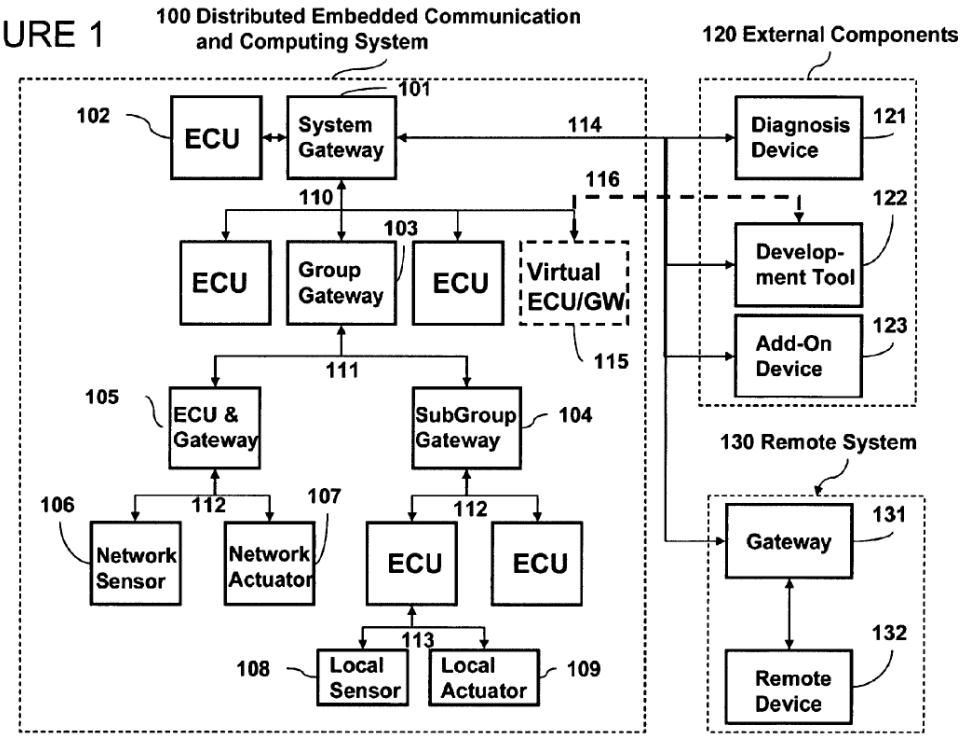


Figure 1 generally depicts elements of a distributed embedded communication and computing system. *Id.* at 3:9–11.

In an automotive environment, various electronic control units ("ECUs") control such applications as engine control, brake control, or diagnostics through connections to various sensors and actuators organized into separate subnetworks. *Id.* at 3:13–18. Such applications are themselves grouped into backbone system functions, such as "body control, power train and chassis." *Id.* at 3:19–21. With a hierarchical organization that includes gateways 101, 103, 104, 105, messages are relayed up and down through the system layers. *Id.* at 3:24–26. Each layer may contain multiple ECUs connected through wired serial multiplexing bus systems, with the '705

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 busses 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.* 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 '705 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 '705 patent, reproduced below, illustrates a logical architecture between three heterogeneous network controllers using such a bulletin board.

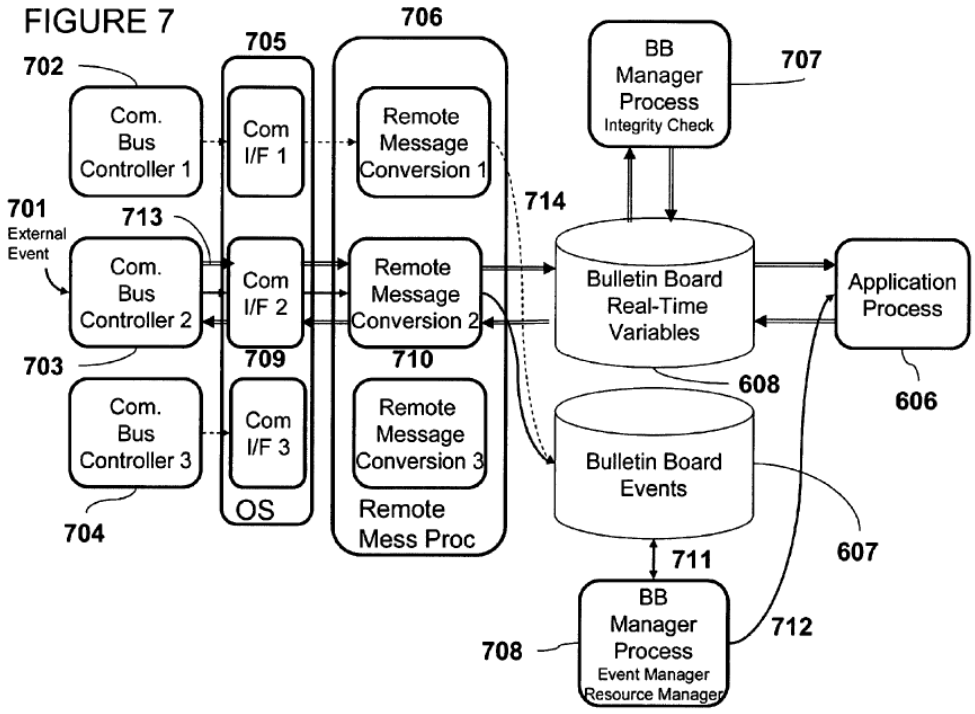


Figure 7 illustrates a system architecture in which a bulletin board acts as a shared memory interacting with multiple communication busses, with data received from one communication bus stored on the bulletin board and shared as a new message with other network types. *Id.* at 7:4–37.

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 5:63–67, 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 the drawing. *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 '705 patent is a continuation of U.S. Patent No. 7,802,263 ("the '263 patent"), filed December 15, 2003, and claims the benefit of the filing date of U.S. Provisional Application No. 60/434,018 ("the '018 provisional application"), filed December 17, 2002. Ex. 1001 at [60], [63].

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. 1011, 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 that Petitioner characterizes as "memory-related": (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 250–252 (emphasis omitted); *see* Pet. 5–6.

The claim that matured into independent claim 7 of the '705 patent (originally filed claim 19) generally paralleled the form of independent claim 1 of the '263 patent at the time of filing, but recited a "computer program product" rather than a "method":

> 19. A computer program product for sharing information in a distributed system, comprising:
>
> computer code for receiving information;
>
> computer code for storing the information on a bulletin board; and
>
> computer code for sharing, in real-time, the information among a plurality of heterogeneous processes.

Ex. 1002, 257. During prosecution, the applicants authorized, among other amendments, the addition of what Petitioner characterizes as "memory-related limitations similar to those in the claims of the '263 patent":

> computer code for, 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;
>
> computer code for, in the event the storage resource is available, causing storage of the information utilizing the on a bulletin board storage resource if the timeout has not been reached; [and]
>
> computer code for, in the event the timeout has been reached, causing an error notification to be sent.

Id. at 87–90 (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.

C. Illustrative Claim

Challenged claim 7, which is illustrative of the challenged claims, is reproduced below with numbers added to identify specific elements of the claim in accordance with the scheme used by Petitioner. *See* Pet. 10–11.

> 7. [0] A non-transitory computer-readable medium storing a computer program product for sharing information, the computer program product comprising:
>
> [1] computer code for allowing receipt of information associated with a message, utilizing a first network protocol associated with a first network;

[2] computer code for causing a determination as to whether a storage resource is available;

[3] computer code for, 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;

[4] computer code for, in the event the storage resource is available and the timeout has not been reached, causing storage of the information utilizing the storage resource;

[5] computer code for, in the event the timeout has been reached, causing an error notification to be sent; and

[6] computer code for causing the information to be shared by:

[7] in real-time, sharing the information utilizing at least one message format corresponding to a second network protocol associated with a second network which is different from the first network protocol;

[8] wherein the computer program product is associated with an electronic control unit with at least one gateway function, and a plurality of interface portions including:

[9] a first interface portion for interfacing with the first network, the first interface portion including a first interface-related first layer part for receiving first interface-related first layer messages and a first interface-related second layer part, the first interface-related first layer messages being processed after which first interface-related second layer messages are provided, where the first network is at least one of a Controller Area Network, a Flexray network, or a Local Interconnect Network; and

[10] a second interface portion for interfacing with the second network, the second interface portion including a second interface-related first layer part for receiving second interface-related first layer messages and a second interface-related second layer part, the second interface-related first layer messages being processed after which second interface-related second layer messages are provided, where the second network

> is different from the first network and is at least one of the Controller Area Network, the Flexray network, or the Local Interconnect Network.

Ex. 1001, 13:5–52.

D. Evidence

Petitioner relies on the following references. Pet. 15–24.

Millsap	US 6,484,082 B1	Nov. 19, 2002	Ex. 1015

OSEK/VDX Binding Specification, Version 1.3 (Sept. 17, 2001) ("OSEK Binding") (Ex. 1007)

OSEK/VDX Communication Specification, Version 2.2.2 (Dec. 18, 2000) ("OSEK COM") (Ex. 1008)

OSEK/VDX Network Management Concept and Application Programming Interface, Version 2.51 (May 31, 2000) ("OSEK NM") (Ex. 1009)

OSEK/VDX Fault-Tolerant Communication, Version 1.0 (July 24, 2001) ("OSEK FTCom") (Ex. 1010)[2]

William Wong, *Software And Hardware Standards Help, But In-Vehicle Network Growth Will Be Conservative: CAN networks and OSEK/VDX-compatible operating systems will drive tomorrow's vehicles*, 49 Elec. Design 62 (Jan. 8, 2001) ("Wong") (Ex. 1012).

[2] Petitioner refers to OSEK Binding, OSEK COM, OSEK NM, and OSEK FTCom collectively as "OSEK/VDX." Where we deem appropriate, we use the same terminology herein.

In addition, Petitioner provides Declarations by Vijay K. Madisetti, Ph.D., Christopher Butler, and R. Benjamin Cassady, which we have also considered. Exs. 1003, 1013, 1014. No cross-examination testimony of these witnesses was filed in the proceeding.

Patent Owner provides a Declaration by Jeffrey A. Miller, Ph.D. Ex. 2001. Dr. Miller was cross-examined by Petitioner, and a transcript of his deposition was entered into the record. Ex. 1027.

E. Asserted Grounds of Unpatentability

Petitioner challenges claims 7–14 and 16–19 over the following combinations of references. Pet. 12.

References	Basis
OSEK/VDX	§ 102(b)
OSEK/VDX	§ 103(a)
OSEK/VDX, Millsap, and Wong	§ 103(a)

We instituted this proceeding on all of the above-identified challenges, except the anticipation ground over OSEK/VDX. Dec. 27. Subsequent to instituting the proceeding, the Supreme Court held that a final written decision under 35 U.S.C. § 318(a) must decide the patentability of all claims challenged in a petition for *inter partes* review. *SAS Institute, Inc. v. Iancu*, 138 S. Ct. 1348 (2018). Accordingly, we notified the parties that "[w]e modify our institution decision to institute on all of the challenged claims and all of the grounds presented in the Petition." Paper 18, 2. Neither party requested further briefing in light of that notification.

F. Real Parties in Interest

Petitioner identifies BMW of North America, LLC, BMW Manufacturing Co., LLC, and Bayerische Motoren Werke, AG as real parties-in-interest in this proceeding. Pet. 66.

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 '705 patent: (1) *Stragent, LLC v. BMW of North America, LLC*, No. 6:16-cv-00446 (E.D. Tex.); (2) *Stragent, LLC v. Mercedes-Benz USA, LLC*, No. 6:16-cv-00447 (E.D. Tex.); and (3) *Stragent, LLC v. Volvo Cars of North America, LLC*, No. 6:16-cv-00448 (E.D. Tex.). Pet. 66; Paper 4, 1–2.

The following *inter partes* review proceedings also involve the '705 patent: IPR2017-00458, IPR2017-00676, IPR2017-01502, and IPR2017-01521.

The following *inter partes* review proceedings involve U.S. Patent No. 8,556,843 B2 ("the '843 patent"), which is a continuation of the '705 patent: IPR2017-00457, IPR2017-00677, IPR2017-01503, IPR2017-01504, IPR2017-01519, and IPR2017-01520.

II. ANALYSIS

A. Claim Construction

In an *inter partes* review proceeding based on a petition filed prior to November 13, 2018, 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).[3] An inventor may provide a meaning for a term that is different from its ordinary meaning by defining the term in the specification with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

1. "real-time"

Independent claim 7 recites "in real-time, sharing the information." Ex. 1001, 13:24–25. The term "real-time" also appears in dependent claim 17. *Id.* at 14:28. Petitioner argues that the Specification of the '705 patent

[3] 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, effective date of the rule change, however, 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.").

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 1 second." Pet. 12; Ex. 1001, 3:35–38. Accordingly, Petitioner proposes that "'real-time' should be construed as responses that occur in less than one second." Pet. 6 (citing Ex. 1003 ¶ 56). Patent Owner contends that the definition from the Specification should be adopted. PO Resp. 14.

We construe "real-time" as Petitioner proposes, i.e., as including responses that occur in less than one second. The first part of the quote cited above provided in the Specification ("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. "isolated from temporal characteristics"

Dependent claim 10 recites that "at least one of the different processes process the information in a manner that is isolated from temporal characteristics associated with at least one of a plurality of heterogeneous networks." Ex. 1001, 13:54–67. Petitioner proposes that "isolated from temporal characteristics" be construed as "unaffected by the temporal behavior," and supports its proposed construction with examples provided in the Specification and with testimony by Dr. Madisetti. Pet. 13 (citing Ex. 1001, 8:47–51, 8:64–9:2, 11:10–13; Ex. 1003 ¶ 57). Patent Owner does not

address construction of the term. Petitioner's proposed construction is reasonable, and we adopt it.

3. "heterogeneous networks"

As noted above, dependent claim 10 recites isolation from temporal characteristics associated "with at least one of a plurality of heterogeneous networks." Ex. 1001, 13:66–67. The Specification of the '705 patent defines "heterogeneous networks": "In the context of the present description, heterogeneous networks may refer to any different communication networks with at least one aspect that is different." Ex. 1001, 7:26–29. In light of this explicit definition, we construe "heterogeneous networks" as Petitioner proposes, i.e., as "networks having at least one aspect that is different." Pet. 13–14 (citing Ex. 1003 ¶ 58). Patent Owner does not address construction of the term.

4. "diagnostic mode"

Dependent claim 18 recites that "multiple modes of operation are enabled, wherein at least one of the modes includes a diagnostic mode." Ex. 1001, 14:33. The Specification of the '705 patent states the following as an enhancement that addresses shortcomings of traditional computer networks:

> The concept that an embedded communication and computing network can run in multiple modes in order to provide for a guaranteed deterministic behavior of the system. This property can be achieved by only allowing change to the configuration and/or the functions (SW code) in a secured configuration and

> upgrade mode. *If the network is booted in the normal operating mode*, all processors execute the existing code and only allow data sharing through the bulletin boards. *The emergency or debug mode lets the network run* in a fail-safe reduced operation mode or *in a diagnostic mode that allows inspection of the system, while it is running*. For each operating mode, the gateway can store a processing image on the bulletin board. The advantage of this procedure is that only the communication hubs need to deal with secure data transfer and encryption while the peripheral nodes in the network can be relative[ly] simple in design.

Id. at 11:51–67 (emphases added). In light of this disclosure, the parties agree that a "diagnostic mode" is a mode that allows inspection of the system while it is running. Pet. 14; PO Resp. 18–19; Reply 9. But Patent Owner contends, in view of the emphasized portions of the disclosure reproduced above, that a "diagnostic mode" is also "a distinct mode from the 'normal operating mode.'" PO Resp. 19.

Patent Owner has the more compelling position, particularly in light of the claim's recitation that "multiple modes of operation are enabled." Ex. 1001, 14:32. Within the context of such multiple modes, and the Specification's description of different modes as distinct from "the normal operating mode," it would be unreasonable to adopt a construction in which a "normal operating mode" that has diagnostic capability falls within the scope of the recited "diagnostic mode."

Accordingly, we construe "diagnostic mode" similarly to how Patent Owner proposes, as a mode, distinct from normal operation, that allows inspection of the system while it is running.

5. Information Sharing

Patent Owner addresses limitations 7.6, 7.7, and 7.10 of the only challenged independent claim, i.e., claim 7, in the context of how they relate to sharing of information. PO Resp. 13–18. Limitations 7.6 and 7.7 recite "computer code for causing the information to be shared by: in real-time, sharing the information utilizing at least one message format corresponding to a second network protocol associated with a second network." Ex. 1001, 13:23–27. According to Patent Owner, "the words '*the* information' clearly refer to information previously identified in the claims." PO Resp. 13–14. Patent Owner contends that such information is "the 'information associated with a message, utilizing a first network protocol associated with a first network' (limitation 7.1) which was caused to be stored utilizing the storage resource (limitation 7.4) – i.e., it is information whose storage was completed to the bulletin board or the storage area." *Id.* Bootstrapping this argument, Patent Owner similarly contends that "the second network" recited in limitation 7.10 is "utilizing a second different protocol which is the recipient of the 'shared' information connected to the storage resource." *Id.* at 15–16 (citing Ex. 2001 ¶ 33).

Patent Owner thus contends that information sharing requires completion of storage to the recited bulletin board or 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.* at 14 (citing Ex. 2003).

We are not persuaded by Patent Owner's contention. Outside of the preamble, claim 7 first recites "information" as part of the requirement of "computer code for allowing receipt of information associated with a message, utilizing a first network protocol associated with a first network." Ex. 1001, 13:8–10. The claim includes recitations for various code that contemplate potentially different actions depending on the satisfaction of different conditions. For example, code causes a "determination as to whether a storage resource is available," and, "in the event the storage resource is available," code "caus[es] storage of the information utilizing the storage resource." Ex. 1001, 13:11–12, 13:18–20. But additional code causes "a re-request in connection with the storage resource" in the event the storage resource is not available, and causes an error notification to be sent if "the timeout has been reached." *Id.* at 13:14–17, 13:21–22. 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 presence of "computer code for causing the information to be shared," specifically by "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 13:24–27. Nothing in the plain language of this element requires that "the information" have been stored with the storage resource. Indeed, Petitioner identifies "embodiments of the specification that share information not using a shared storage." Reply 6–7. In particular, the Specification of the '705 patent describes "horizontal information sharing in a hierarchical system" where output variables generated by an ECU are output to local actuators, which are connected via discrete signal lines or networked actuators connected via a multiplexing bus. *See* Ex. 1001, 8:51–59, 7:38–49 ("In an alternate embodiment of the remote message communication process . . . [t]o communicate between two heterogeneous networks, this process may then be repeated in reverse by adding back the header information for the various layers of the second network, and eventually putting the message onto the second network's physical link."); *see* Tr. 10:19–12:7 (Petitioner, at oral hearing, discussing embodiment that shares information without using a shared storage). Furthermore, the description of "information" as "capable of being stored *and* shared" in the '705 patent Specification is consistent with storage and sharing being distinct concepts. *See* Ex. 1001, 3:56–59 (emphasis added).

At the oral hearing, in discussing similar limitations that appear in independent claim 1 of the related '843 patent, Patent Owner argued that "the information" recited in element 1.7 ("in real-time, sharing *the information* utilizing at least one message format corresponding to a second

network protocol associated with a second network") (emphasis added) necessarily refers to "the information" recited in element 1.5 (code for, in the event the storage resource is available, causing storage of *the information* utilizing the storage resource") (emphasis added):

> Our position is that the information then appears in Element 1.5, which says the information is stored utilizing a storage resource. Therefore, the next time the word the information is used, it's now referring to the last antecedent basis, which is no longer Element 1.1. The last antecedent basis is Element 1.5.

Tr. 48:10–14. But Patent Owner is unable to identify sufficient legal basis for its "last antecedent" theory. *See id.* at 40:8–15 ("I have not found the concept in patent claim construction.").

In addition to these considerations, we note that Patent Owner has submitted a definition of "share" drawn from a technical dictionary into the record of this proceeding. Ex. 2004.[4] We find the technical dictionary provided by Patent Owner to be more probative than the general-purpose dictionary Patent Owner quotes.

The language of the general-purpose dictionary definition that states "to partake of, use, experience, occupy, or enjoy with others; to have in

[4] 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).

common," does not appear to contemplate the sharing of "information," which the '705 patent Specification 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 '705 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 Specification, 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.

6. Other Terms

We do not find it necessary, for purposes of this Decision, to construe any other terms explicitly. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (citing *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)) (only terms in controversy need to be construed, and only to the extent necessary to resolve the controversy).

B. Effective Filing Date

Petitioner contends that the challenged claims are entitled to claim the benefit of only the December 15, 2003, filing date of the '263 patent, and, in particular, that they are not entitled to the December 17, 2002, filing date of the '018 provisional application. Pet. 7–9. Petitioner argues that "the '263 patent is the first instance where Patent Owner even arguably disclosed" the "memory-related limitations," and that the '018 provisional application does not disclose

> at least the following limitations of claim 7: "computer code for, 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," "computer code, in the event the storage resource is available and the timeout has not been reached, causing storage of the information utilizing the storage resource," and "computer code for, in the event the timeout has been reached, causing an error notification to be sent." EX 1001, claim 7, *see generally* EX1005.

Id. at 9. Petitioner further contends that "the ['018] provisional application simply and generally states that 'the bulletin board manager provides mechanisms for access control,'" and that "[t]his broad statement in no way discloses the claim limitations described above." *Id.* (citing Ex. 1005, 8). Patent Owner does not present any evidence or argument that the '705 patent is entitled to claim the benefit of the '018 provisional application filing date.

For a claim of a patent to claim priority from the filing date of its provisional application, the provisional application must contain a written description of the claim in the manner set forth under 35 U.S.C. § 112. 35

U.S.C. § 119(e)(1). Although a petitioner bears the ultimate burden of persuasion to show a claim is unpatentable, a second and distinct burden—the burden of production—is a shifting burden. *Dynamic Drinkware, LLC v. National Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). In cases such as here, where Petitioner has presented sufficient evidence and argument of unpatentability based on a reference that pre-dates the filing date of the '705 patent, Petitioner meets its initial burden of production. *Id.* at 1379. The burden then shifts to Patent Owner to show that the '018 provisional application provides written description support for the challenged claims of the '705 patent. *Id.* at 1380. As we discuss above, Patent Owner does not provide any evidence or argument in this regard, and therefore does not meet its burden of production to show the challenged claims are entitled to the benefit of the '018 provisional application filing date. Therefore, based on the record, we accord the challenged claims the December 15, 2003, filing date of the '263 patent.

We note that, although the burden has not shifted to Petitioner, the Petition identifies specific claim limitations Petitioner contends are unsupported by the '018 provisional application and identifies specific disclosure in the '018 provisional application that it contends is insufficient. Pet. 4–5.

C. Legal Principles

To establish anticipation, each and every element in a claim, arranged

as recited in the claim, must be found in a single prior art reference. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008); *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383 (Fed. Cir. 2001). While the elements must be arranged in the same way as is recited in the claim, "the reference need not satisfy an *ipsissimis verbis* test." *In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009); *In re Bond*, 910 F.2d 831, 832–33 (Fed. Cir. 1990). Identity of terminology between the anticipatory prior art reference and the claim is not required. Prior art references must be "'considered together with the knowledge of one of ordinary skill in the pertinent art.'" *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

Also, "it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom." *In re Preda*, 401 F.2d 825, 826 (CCPA 1968). As the Court of Appeals for the Federal Circuit recently explained, the dispositive question for anticipation is whether one skilled in the art would reasonably understand or infer from a prior art reference that every claim element is disclosed in that reference. *Eli Lilly & Co. v. Los Angeles Biomedical Research Inst.*, 849 F.3d 1073, 1074–75 (Fed. Cir. 2017).

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.[5] *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. 2006) (requiring "articulated reasoning with some rational underpinning to support the legal conclusion of obviousness")); *see In re Warsaw Orthopedic, Inc.*, 832 F.3d 1327, 1333 (Fed. Cir. 2016) (citing *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1360 (Fed. Cir. 2006)).

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*

[5] The parties do not address secondary considerations, which accordingly do not form part of our analysis.

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*, 800 F.3d at 1378 (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." *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016).

D. Level of Skill in the Art

The parties advocate for the adoption of similar levels of ordinary skill in the art. Petitioner contends that a person of ordinary skill "would have a bachelor's degree in electrical engineering, computer engineering, or a related engineering discipline and at least two years of industry experience in the field of distributed computing or automotive engineering, or equivalent experience, education, or both." Pet. 10. In addition, Petitioner contends that such a person "would also have knowledge or familiarity with in-vehicle computing." *Id.* (citing Ex. 1003 ¶¶ 62–63). Dr. Madisetti's testimony supports Petitioner's proposal. Ex. 1003 ¶¶ 62–63.

> Patent Owner similarly contends that a person of ordinary skill 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. 19. Dr. Miller's testimony supports Patent Owner's proposal. Ex. 2001 ¶ 17. The principal difference between the levels proposed by the parties is Petitioner's requirement that the person have knowledge or familiarity with "in-vehicle computing." Although the Specification illustrates its systems and methods for sharing information in a distributed system in the context of vehicle applications, the claims are not so limited. We are not persuaded that familiarity with in-vehicle computing would be a characteristic of a person of ordinary skill in the relevant art. We therefore adopt Patent Owner's expression of the level of skill in the art, noting that it instead requires some level of familiarity with embedded networking technologies.

E. Testimony of Dr. Miller

Petitioner argues that the testimony of Patent Owner's expert, Dr. Miller, "deserves little weight because he misapplies the law and provides contradictory testimony." Reply 2. Specifically, Petitioner contends that Dr. Miller (1) does not understand or apply the principles of broadest reasonable interpretation in his claim constructions; (2) imports limitations from the Specification into the claims; (3) does not understand what defines an invention; and (4) cannot identify an antecedent basis. *Id.* at 3.

As Petitioner recognizes, in a related *inter partes* review proceeding, we "agree[d] with Petitioner that Dr. Miller did not provide responses sufficient to conclude that he was aware of and/or applied the correct claim-construction standard." *BMW of N. Am., LLC v. Stragent, LLC*, Case IPR2017-00677, slip op. at 13–14 (PTAB June 13, 2018) (Paper 32). But deficiencies in Dr. Miller's testimony in that earlier proceeding have largely been cured in the instant proceeding. *See, e.g.*, Ex. 2001 ¶ 28 ("I have been advised, and it is my understanding, that patent claims in IPR proceedings such as this are given their broadest reasonable construction in view of the patent claims, specification, file history, and the understanding of one having ordinary skill in the relevant art at the time of the invention.").

We have reviewed the deposition testimony to which Petitioner draws our attention, and disagree that Dr. Miller's imprecisions regarding patent law are sufficient to discount or limit the weight accorded to his opinions. *See* Reply 3–6. Technical experts are not expected to be legal authorities, and Dr. Miller's opinions are helpful to us as the trier of fact. *See* Fed. R. Evid. 702 (stating conditions under which an expert witness may testify in the form of an opinion). We are also not persuaded by Petitioner's argument that Dr. Miller's opinions should be given reduced weight because "he is a pay for opinion expert, whose opinions reflect counsel instructions rather than his views." Reply 5. Despite Petitioner's allusions, we see nothing irregular or improper with Dr. Miller's acknowledgment that Patent Owner's "attorneys did provide some clarifications and help in preparing the

declaration." *See id.*; Ex. 1027, 30:21–24. Dr. Miller swears to the statements in his Declaration under penalty of perjury, and we see no compelling reason not to accord those states due weight. Ex. 2001, 44.

F. Anticipation by OSEK/VDX

Petitioner's expert, Dr. Madisetti, describes OSEK/VDX as "a joint project by sixty-two automotive companies creating an open-ended architecture standard for distributed ECUs in vehicles." Ex. 1003 ¶ 79 (citing Ex. 1007, 2). Dr. Madisetti further explains that "OSEK/VDX is a standard for interfacing distributed ECUs with real-time operating systems found in automotive networks," including "seven specifications that together describe 'interfaces and protocols for the transfer of data . . . between and within network stations (ECU's).'" *Id.* ¶ 80 (quoting Ex. 1007, 6) (alteration by Dr. Madisetti).

Petitioner's anticipation challenge based on OSEK/VDX relies on a combination of four references (OSEK Binding, OSEK COM, OSEK FTCom, and OSEK NM) that describe different aspects of various versions of the OSEK/VDX standard. *See* Pet. 12. Petitioner focuses its attention on version "SB3," which OSEK Binding discloses as encompassing the specific documents relied on, i.e., including version 1.3 of the Binding specification, version 2.2.2 of the communication ("COM") specification, version 2.5.1 of the network-management ("NM") specification, and version 1.0 of the OSEKtime COM ("FTCom") specification. Ex. 1007, 9.

Petitioner contends that these individual specifications "were originally available at http://osek-vdx.org" and were archived by the Wayback Machine on September 26, 2001, more than a year before both the effective filing date we accord the claims and more than a year before the filing date of the '018 provisional application. Pet. 17. To support its contention that the individual documents were publicly accessible on September 26, 2001, Petitioner provides a Declaration of Christopher Butler, Office Manager at the Internet Archive, which manages the Wayback Machine, attesting to its practices regarding archival of files on the Internet. Ex. 1013. Petitioner additionally provides a Declaration of R. Benjamin Cassady, attesting to his retrieval of certain documents, including Ex. 1006, which Petitioner contends "confirms that OSEK[ ]FTCom was known to a [person of ordinary skill in the art] at least by December 10, 2002." Ex. 1014; Pet. 19. Petitioner provides sufficient evidence that each of OSEK Binding, OSEK COM, OSEK FTCom, and OSEK NM is a printed publication.

Nevertheless, we are not persuaded that the four documents are properly considered to constitute a single prior-art reference. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, *in a single prior art reference*." *Verdegaal Bros., Inc. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987) (emphasis added).

Petitioner contends that "OSEK/VDX is a 'single prior art reference' and thus qualifies as prior art under § 102(a) and/or (b) because the standard comprises only seven specifications, all authored by the same group, and would be considered together, evidenced by their linking and cross-referencing." Pet. 19–20 (citing *Enzo Biochem, Inc. v. Gen-Probe Inc.*, 424 F.3d 1276, 1285 (Fed. Cir. 2005)). Although Petitioner correctly observes that "[t]he specifications that make up OSEK/VDX version SB3 are indexed within OSEK Binding," Petitioner's overall focus on what it contends is common authorship insufficiently accounts for the different dates of creation of the individual documents. Pet. 20; *see Kyocera Wireless Corp. v. Int'l Trade Comm'n*, 545 F.3d 1340, 1351–52 (Fed. Cir. 2008) (noting "the GSM standard is actually several prior art references with separate dates of creation, rather than a single prior art reference," and "the GSM standard is simply not a coherent whole document that can be assigned a single prior art date of creation").

First, each of the individual documents bears a different date on its face, belying any conclusion that they are properly considered as a single reference. Ex. 1007, 1 (Binding Specification dated September 17, 2001); Ex. 1008, 1 (Communication specification dated December 18, 2000); Ex. 1009, 1 (Network Management specification dated May 31, 2000); Ex. 1010, 1 (Fault-Tolerant Communication specification dated July 24, 2001). The SB3 version of the OSEK/VDX standard evidently arises from selective reference to different versions of the individual specifications as

they have evolved over time. *See* Ex. 1007, 3 ("As the standardisation of requirements that are applicable to different OSEK/VDX specifications should not be replicated within the different specifications, this document is therefore set-up to collate all requirements that are owned by the different specifications.") (italicization omitted).

Second, Petitioner's argument that the individual documents are commonly authored is tenuous at best. Petitioner too sweepingly treats two groups responsible for creation of the documents (the "OSEK group" and the "OSEK/VDX steering committee") as defining a single authorship, without addressing the composition of those groups and potential changes in that composition over the time period in which the individual specifications were created. *See* Pet. 21. This deficiency is particularly notable in light of the large number of entities (sixty-two automotive companies) that "attended and contributed to the OSEK/VDX Technical Committee." *See* Ex. 1007, 2.

Accordingly, we find that OSEK Binding, OSEK COM, OSEK FTCom, and OSEK NM are not collectively a "single prior art reference," and therefore conclude that Petitioner has not shown, by a preponderance of the evidence, that claims 7–14 and 16–19 are anticipated by the collection of documents identified by Petitioner as OSEK/VDX.

G. Obviousness over OSEK Binding, OSEK COM, OSEK FTCom, and OSEK NM

As an alternative to its anticipation challenge, Petitioner contends that claims 7–14 and 16–19 would have been obvious over OSEK/VDX. Pet. 59. Petitioner reasons that a person of ordinary skill in the art "would naturally consider the OSEK/VDX specifications together in order to gain a complete understanding of the standard and the capabilities of ECU nodes," supporting that reasoning with testimony by Dr. Madisetti. *Id.* (citing Ex. 1003 ¶ 197). Particularly in light of OSEK Binding's specific reference to each of the specifications in defining version SB3 (Ex. 1007, 9), we agree with that contention and conclude that Petitioner articulates sufficient reasoning to combine the teachings of the four documents. Patent Owner does not contest Petitioner's rationale for combining the teachings of the four documents.

1. Independent Claim 7

a. Preamble

The preamble of challenged claim 7 recites "[a] non-transitory computer-readable medium storing a computer program product for sharing information." Ex. 1001, 13:5–6. Petitioner contends that the OSEK/VDX references relate to "interfaces and protocols for in-vehicle communication . . . between networked vehicle nodes (inter-ECU communication)," and that they disclose that the system can be implemented by software, i.e., "a

computer program product." Pet. 25–26. We agree with the contention, which Patent Owner does not address in its Response.

b. Element 7.1

In analyzing the specific limitations in the body of claim 7, the Petition focuses primarily on OSEK NM, supplementing its analysis with specific reference to portions of OSEK COM, particularly in addressing limitations dealing with the treatment of the availability of a storage resource and real-time sharing of information, as well as in addressing the interfaces recited in limitations 1.9 and 1.10. Pet. 26–47.

Figure 2 of OSEK NM is reproduced below.

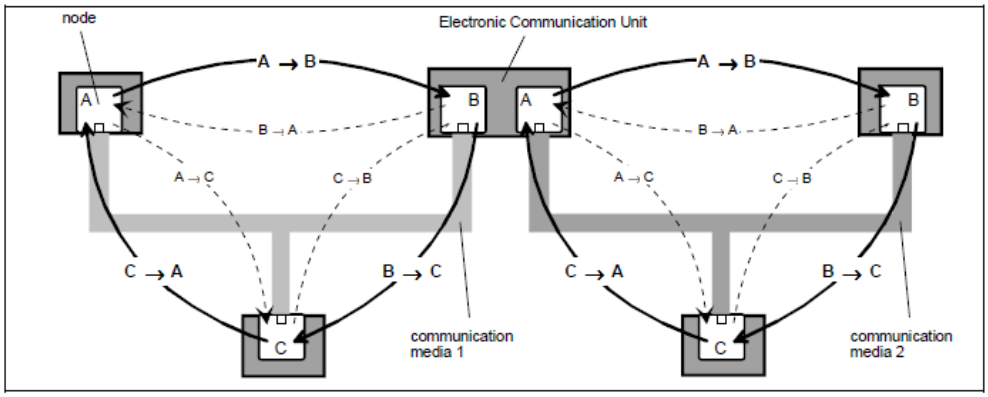


Figure 2 Infrastructure of the NM (logical ring), example with two busses

Figure 2 shows an infrastructure of a logical ring that includes an electronic communication unit and in which, for example, node A receives messages from node C. Ex. 1009, 9. According to Petitioner, OSEK/VDX discloses limitation 7.1, "computer code for allowing receipt of information associated with a message, utilizing a first network protocol associated with a first

network." Pet. 26–27. According to Petitioner, OSEK/VDX describes receiving information associated with a message by virtue of its disclosure of transmitting and receiving information between ECUs using networks such as CAN, VAN, J158, K-BUS, and D2B. *Id.* at 26 (citing Ex. 1009, 7). Petitioner reasons that OSEK/VDX discloses using a "first network protocol associated with a first network" because each of the disclosed networks has a network protocol associated with it. *Id.* (citing Ex. 1003 ¶ 156). This reasoning is persuasive and is not contested by Patent Owner.

c. Element 7.2

With respect to element 7.2, which recites "computer code for causing a determination as to whether a storage resource is available," Petitioner argues that the "data buffer" in each node of the OSEK/VDX system is a storage resource. *Id.* at 28–29 (citing Ex. 1009, 9–10). According to Petitioner, "each node 'is actively monitored by every other node in the network' to determine whether another node, and consequently the storage resource [i.e., data buffer] is available." *Id.* at 28–29 (citing Ex. 1009, 8–10, 49).

In advancing this argument, Petitioner makes the statement that "[w]hen operating in normal mode, each node determines that another node . . . is 'alive' and available by receiving any message from another node following the algorithm as shown in [Figure 32 of OSEK NM]." *Id.* at 28–29. Patent Owner disputes the statement, arguing that "an 'alive' message is

clearly not used to determine if a resource is available" because "OSEK explicitly states that '[a]n alive message introduces a new transmitter to the logical ring.'" PO Resp. 27 (quoting Ex. 1009, 10) (alteration by Patent Owner). But as Petitioner explains in its Reply, "even assuming that is all an alive message does," the claim limitation is still satisfied because the data buffer of the introduced node is a "storage resource" and the introduced node is also actively monitored by every other node in the network to determine its availability. Reply 13–14 (citing Ex. 1009, 8–10; Pet. 18–19). We agree with this argument and find it properly responsive to Patent Owner's argument.

d. Element 7.3

For element 7.3, "computer code for, 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," Petitioner relies on disclosure in OSEK NM of receiving periodic messages from a node indicating the node is available and able to store data; and that if such message is not received by the node within a specified timeframe, i.e., if the timeout has been reached, the node is determined to be unavailable. Pet. 29–30 (citing Ex. 1009, 9–10, 24–26, 45, 47, 52, Figs. 11, 14, 29, 30, 35). Notably, if the specified timeframe is exceeded, a timer resets; and if a message is received after the reset but before the timeframe is exceeded again, i.e., if the timeout has not been reached, a "re-request in connection

with the storage resource" is made. *Id.* at 30–31 (citing Ex. 1009, 25, 52, Fig. 35).

Patent Owner disputes this analysis, arguing that "Petitioner relies on an inversion of the disclosed OSEK/VDX process of monitoring the logical ring." PO Resp. 28. Patent Owner characterizes Petitioner's argument as "point[ing] directly to ***receipt*** of a message as evidence for disclosure of ***issuing*** another storage request." *Id.* We agree with Petitioner that Patent Owner's argument imposes an additional requirement not recited in the plain language of element 7.3. Reply 12. In particular, that element does not state where or how the request and determination are made, so requesting a node to make a determination of the availability of another node based on messages received from that node falls within the scope of the claim element. Thus, we agree with Petitioner's arguments as to this element and find they refute Patent Owner's argument.

e. Element 7.4

For element 7.4, which recites "computer code for, in the event the storage resource is available and the timeout has not been reached, causing storage of the information utilizing the storage resource," Petitioner argues that OSEK NM teaches that if T_{Error} has not occurred and a node is available, a message is received by the node and the data in the message are stored in a data buffer (i.e., information is stored in the storage resource). Pet. 31–33 (citing Ex. 1009, 11, 20, 52, Figs. 4, 35). We find that Petitioner adequately

identifies disclosure of the limitation in the cited art, and Patent Owner does not dispute this aspect of Petitioner's analysis.

f. Element 7.5

For element 7.5, which recites "computer code for, in the event the timeout has been reached, causing an error notification to be sent," Petitioner relies on OSEK NM's disclosure that, upon a time-out of T_{Error} (i.e., in the event a threshold has been reached), a "LimpHome" message (i.e., an "error notification") is transmitted. Pet. 33–34 (citing Ex. 1009, 25, Fig. 35). We find that Petitioner adequately identifies disclosure of the limitation in the cited art, and Patent Owner does not dispute this aspect of Petitioner's analysis.

g. Elements 7.6–7.8

For element 7.6, which recites "computer code for causing the information to be shared," Petitioner asserts that OSEK/VDX discloses "sharing message data that a node receives from a logical predecessor with a logical successor." Pet. 34–35 (citing Ex. 1009, 11, 20, Fig. 4).

For element 7.7, which recites "in real-time, sharing the information utilizing at least one message format corresponding to a second network protocol associated with a second network which is different from the first network protocol," Petitioner relies on disclosure in OSEK NM that shared messages are received by logical successors from logical predecessors

within predetermined time T_{Typ} of 70 milliseconds, where we have construed "real-time" as including "responses that occur in less than one second." *Id.* at 35–36 (citing Ex. 1009, 20–22, 60, Fig. 10). Petitioner also relies on disclosure in OSEK NM relating to the various busses that may be connected to the micro controller. *Id.* at 36 (citing Ex. 1009, 7, Fig. 1). For example, a node may receive messages from a first network that is a low-speed CAN network, and transmit the messages to a second network that is a high-speed CAN network. *Id.* at 37 (citing Ex. 1009, 8; Ex. 1008, 111–112).

For element 7.8, which recites "wherein the computer program product is associated with an electronic control unit with at least one gateway function, and a plurality of interface portions," Petitioner relies, in pertinent part, on OSEK Binding's disclosure of a gateway ECU that includes a plurality of interface portions that interface with Networks 1 through k. *Id.* at 37–40 (citing Ex. 1007, 6, Figs. 1–2).

Patent Owner disputes Petitioner's analysis with respect to these limitations, arguing that Petitioner

> ignores that the limitations specifically reference[] "the information," which is the "information associated with a message received utilizing a first network protocol associated with a first network" (limitation 7.1) which was caused to be stored utilizing the storage resource (limitation 7.4) – i.e., it is information whose storage was completed to the bulletin board or the storage resource.

PO Resp. 28–29. This is essentially the same argument that we address in detail above as a matter of claim construction. As we explain there, the

plain language of the claims, intrinsic evidence in the form of the Specification, and extrinsic evidence in the form of a technical-dictionary definition support a construction of information sharing that does not require storage of the information. In advancing this argument with respect to elements 7.7 and 7.8, Patent Owner improperly seeks to import certain specific embodiments described in the Specification into the claims. But "[i]t is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude.'" *Phillips*, 415 F.3d at 1323 (citing *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). The claims are "the sole measure of the grant." *Innova/Pure Water, Inc.*, 381 F.3d at 1115 (citing *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 339 (1961)).

In addition, Patent Owner disputes Petitioner's identification of separate networks, asserting that "[n]othing in OSEK suggests that the 'logical predecessor' and 'logical successor' can be different networks." PO Resp. 30. According to Patent Owner, "there is no second network." *Id.* We are not persuaded by this argument in light of OSEK NM's teaching that "[a] micro processor with two communication modules connected to two different communication media (e.g., low speed CAN and a high speed CAN) represents two nodes from the OSEK point of view." Ex. 1009, 8. This disclosure is consistent with Petitioner's position that messages are shared among networks with different protocols, particularly in light of

OSEK NM's further disclosure that "[a]ny node must be able to send NM messages to all other nodes and receive messages from them." *Id.* at 9. As Petitioner asserts, this "requires nodes of different networks [to] be able to communicate with each other." Reply 17.

We find that Petitioner sufficiently identifies the limitations as taught in the prior art, and we are not persuaded by Patent Owner's arguments for the reasons discussed more thoroughly above in connection with claim construction.

h. Elements 7.9 and 7.10

In its analysis of the remaining limitations, Petitioner points to Figure 1 of OSEK NM, reproduced below, and related disclosure that describes a data link layer for interfacing with the underlying network. *See* Pet. 42.

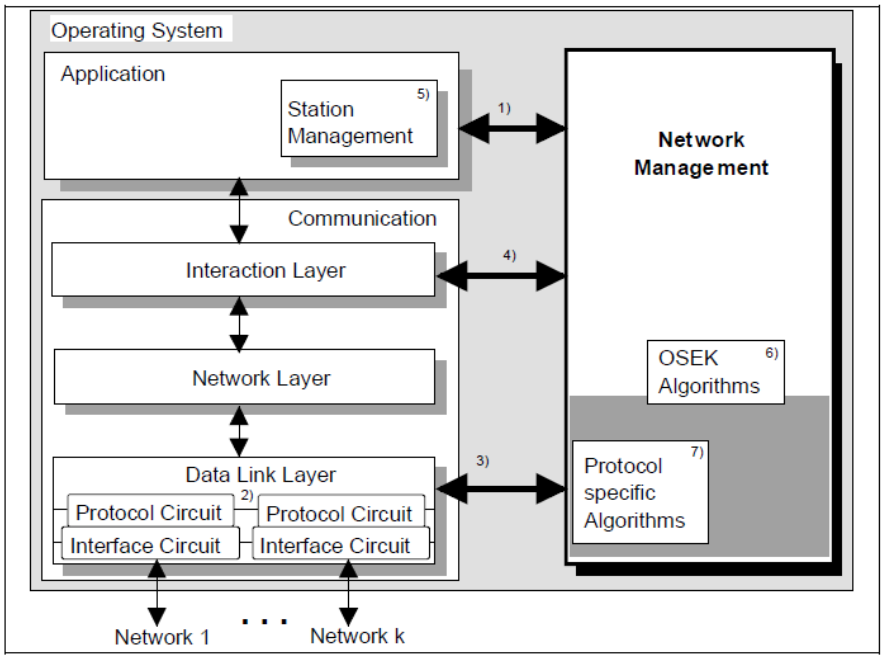


Figure 1 interface and algorithms responsibility

Figure 1 illustrates "interface and algorithms responsibility" of an ECU microcontroller with multiple interfaces shown in the "Data Link Layer" ("DLL") in the lower left of the drawing. Ex. 1009, 7. To address the specific structure for the interfaces recited in limitations 7.9 and 7.10, Petitioner provides an annotated drawing that makes correspondences between the "first interface portion" and communication to "Network 1," and similarly between the "second interface portion" and communication to "Network k." Pet. 45. Petitioner further argues that the recited "first layer part for receiving . . . first layer messages" of the interface portion corresponds to the Interface Circuit in the DLL, and that the recited "second layer part" corresponds to the Protocol Circuit in the DLL. *Id.* For the requirement that the first layer messages are processed, after which second

layer messages are provided, Petitioner relies on disclosure in OSEK COM and OSEK NM that DLL Interface Circuits receive messages (i.e., first layer messages are received) and transfer them to the network layer via the Protocol Circuit (i.e., second layer messages are provided). *Id.* at 41 (citing Ex. 1008, 15; Ex. 1009, 7, 20, Figs. 1, 9).

Patent Owner does not dispute Petitioner's showing that the cited disclosures describe the subject matter of these limitations, which we find persuasive.

i. Summary

We are persuaded by Petitioner's showing that the combination of references referred to herein as OSEK/VDX would have suggested the limitations of claim 7 and that the combination would have been obvious, for the reasons provided by Petitioner and summarized herein. Accordingly, we conclude Petitioner has shown, by a preponderance of the evidence, that claim 7 is unpatentable under 35 U.S.C. § 103(a) over OSEK/VDX.

2. Claim 8

Claim 8 depends from claim 7 and recites that "the storage resource includes a bulletin board." Ex. 1001, 13:54–55. For this limitation, Petitioner identifies a message storage structure in OSEK FTCom in which messages are shared by different tasks. Pet. 48 (citing Ex. 1010,[6] 12, Fig. 3-

[6] Petitioner's citation to Ex. 1009 appears to be a typographical error.

1). Petitioner alternatively identifies a "ring data buffer" in OSEK NM as a Network Management structure for storing ring messages and for data exchange among different applications. Pet. 49 (citing Ex. 1009, 20–21, Fig. 10). In light of the Specification's explanation of a "bulletin board," we agree with Petitioner that "[t]he ring data buffer therefore is a bulletin board," and find that Petitioner thus makes a sufficient showing. *See id.* (citing Ex. 1003 ¶ 181).

We conclude that Petitioner shows, by a preponderance of the evidence, that claim 8 is unpatentable under 35 U.S.C. § 103(a) over OSEK/VDX.

3. Claim 9

Claim 9 depends from claim 7 and recites that the computer program product is operable such that "the first interface-related second layer part carries out the processing of the first interface-related first layer messages." Ex. 1001, 13:58–61. Petitioner contends that such processing is disclosed by OSEK NM, in which messages are transferred to the "Protocol Circuit" after the messages are received by the "Interface Circuit," as illustrated in Figure 1 of OSEK NM, reproduced above. Pet. 49–50. Such processing is consistent with the claim limitation, and we find Petitioner's reasoning, which is not separately disputed by Patent Owner, to be persuasive.

We conclude that Petitioner shows, by a preponderance of the evidence, that claim 9 is unpatentable under 35 U.S.C. § 103(a) over OSEK/VDX.

4. Claims 10–13

Claim 10 depends from claim 7 and recites that the computer program product is operable such that "at least one of the different processes process the information in a manner that is isolated from temporal characteristics associated with at least one of a plurality of heterogeneous networks." Ex. 1001, 13:63–67. Citing OSEK FTCom, in which application software and FTCom Layer are executed under control of an operating system, with executed processes independent of the underlying network, Petitioner reasons that the information is processed by at least one of the different processes in a manner independent of the temporal behavior of at least one underlying network. Pet. 51. This reasoning is consistent with our adopted constructions of "heterogeneous networks" and "isolated from temporal characteristics."

According to Petitioner, in this arrangement, "[i]n order for the operating system to exercise control and management, the information has to be shared with the operating system." *Id.* at 52–53. We agree, and thereby find that Petitioner also makes a sufficient showing with respect to claim 11, which depends from claim 7 and recites that the computer program product

is operable such that "the information is shared with an operating system." Ex. 1001, 14:2–4.

With respect to claim 12, which recites that the computer program product is operable such that "objects are generated based on a change of state of the information stored on the storage resource," Petitioner further reasons that "the OSEK time operating system core offers all basic services for real-time applications, including interrupt handling." *Id.* at 14:7–8; Pet. 53. For example, Petitioner specifically observes that "OSEK FTCom discloses that the time-interrupts are generated based on changes of state, such as 'the event of data corruption,' and 'missing, late or early messages.'" Pet. 53–54 (citing Ex. 1010, 11; Ex. 1003 ¶ 189). Through this observation, Petitioner makes a sufficient showing, as it does for claim 13, which depends from claim 12 and specifically recites "interrupts" as part of its limitation that the computer program product is operable such that "the objects include at least one of flags, events, signals, and interrupts."[7] Ex. 1001, 14:10–11.

Patent Owner does not separately dispute these aspects of Petitioner's analysis for claims 10–13. We conclude that Petitioner shows, by a preponderance of the evidence, that claims 10–13 are unpatentable under 35 U.S.C. § 103(a) over OSEK/VDX.

[7] The Petition incorrectly refers to "Staiger" in part of its analysis of claim 13. Pet. 54. This is an apparent error since Staiger is not applied in this proceeding, and we treat the reference to "Staiger" as intended to refer to "OSEK/VDX."

5. Claims 14 and 16

Claims 14 and 16 each depend from claim 7 and respectively recite that the computer program product is operable such that the real-time involves a response time that "is measured in milliseconds" and that "is less than 1 second." Ex. 1001, 14:13–15, 14:21–23.

Petitioner addresses these limitations with OSEK NM's disclosure of an example in which T_{Typ}, the time within which the sharing occurs, is described as "70*ms*," satisfying the limitations of both claims. Pet. 54–55. Patent Owner does not dispute this aspect of Petitioner's analysis.

We conclude that Petitioner shows, by a preponderance of the evidence, that claims 14 and 16 are unpatentable under 35 U.S.C. § 103(a) over OSEK/VDX.

6. Claims 17 and 19

Claims 17 and 19 each depend from claim 7, with claim 17 reciting that the computer program product is "part of an apparatus including a plurality of layers including at least two of an application layer, a middleware layer, a real-time operating system layer, a device driver layer, and a hardware abstraction layer," and claim 19 reciting that the computer program product is operable such that "at least a portion of the message is processed at each of a plurality of layers." Ex. 1001, 14:25–29, 14:35–37. Petitioner addresses the layer structure by observing that Figure 2-1 of OSEK FTCom, reproduced above, illustrates a "layered model of OSEKtime

FTCom architecture" with multiple layers. Pet. 55; Ex. 1010, 9. In particular, Petitioner identifies OSEK FTCom's Bus Communication Hardware as the recited "hardware abstraction layer," identifies OSEK FTCom's Bus I/O Driver as the recited "device driver layer," identifies OSEK FTCom's Interaction Layer and Fault Tolerant Layer as the recited "middleware layer," and identifies OSEK FTCom's Application layer as the recited "application layer." Pet. 55–56; *see* Ex. 1010, 8, Figs. 2-1, 2-2.

For claim 19's recitation that at least a portion of the message is processed at each of a plurality of layers, Petitioner further observes that Figure 2-2 of OSEK FTCom illustrates that messages are received and stored in a communication network interface ("CNI"), which can be accessed by application tasks. Pet. 58 (citing Ex. 1010, 12). Because the message instances are then transported by OSEK FTCom's Interaction Layer into Fault Tolerant Layer, which extracts the message status information, and because the messages are then filtered by the Message Filter Layer before further processing by the Application Layer, Petitioner contends that the limitation of claim 19 is met.

These identifications by Petitioner are not separately disputed by Patent Owner, and we agree that they disclose the respective limitations. Accordingly, we conclude that Petitioner shows, by a preponderance of the evidence, that claims 17 and 19 are unpatentable under 35 U.S.C. § 103(a) over OSEK/VDX.

7. Claim 18

Claim 18 depends from claim 7 and recites that the computer program product is operable such that "multiple modes of operation are enabled, wherein at least one of the modes includes a diagnostic mode." Ex. 1001, 14:31–33. As noted above, we agree with Patent Owner that a "diagnostic mode" is distinct from a normal-operation mode, and allows inspection of the system while it is running.

Petitioner's analysis of this point developed during the trial in light of Patent Owner's arguments and our claim construction. Specifically, the Petition presents an argument implicitly grounded in Petitioner's position, broader than the one we adopt, that "'diagnostic mode' should be construed to mean an operation mode that allows inspection of the system while the system is running," i.e., a mode that could include a normal-operation mode. *See* Pet. 57; Reply 17. But in its Reply, Petitioner identifies an "optional feature" of OSEK NM that includes "*dedicated* enhanced diagnosis support [that] could be mapped into the data field of the NM message." Reply 18; Ex. 1009, 123 (emphasis added).

We agree with Petitioner that this "optional feature" of OSEK/VDX meets the claim limitation. Moreover, we find Petitioner's Reply argument to be properly responsive to Patent Owner's argument in light of the development of the construction of "diagnostic mode" during the trial. Accordingly, we conclude that Petitioner shows, by a preponderance of the

evidence, that claim 18 is unpatentable under 35 U.S.C. § 103(a) over OSEK/VDX.

H. Obviousness Over OSEK/VDX, Millsap, and Wong

Petitioner challenges claims 7–14 and 16–19 as unpatentable under 35 U.S.C. § 103(a) over OSEK/VDX, Millsap, and Wong. Pet. 59–66. For independent claim 7, Petitioner relies on its analysis over OSEK/VDX, but contends that, even if OSEK/VDX "does not expressly disclose the limitations 7.8-7.10, OSEK/VDX in combination with *Millsap* and *Wong* teaches these limitations." *Id.* at 60 (citing Ex. 1003 ¶ 199).[8] For the dependent claims, Petitioner relies on its identification of the recited features in OSEK/VDX. *Id.* at 66.

1. Millsap

Millsap "relates to networks used in vehicles to provide distributed control of various vehicle functions and, more particularly, to such networks which utilize different groupings of electronic control units (ECUs) to carry out different control tasks." Ex. 1015, 1:6–10. In particular, Millsap describes "an on-board vehicle network which utilizes a network

[8] The Petition incorrectly refers to "Staiger" in making this statement. Pet. 59, 60. This is an apparent error because Staiger is not applied in this proceeding, and we treat the statement as intended to refer to "OSEK/VDX."

management strategy that permits distributed ECUs on the network." *Id.* at 2:27–33.

Figure 9 of Millsap is reproduced below.

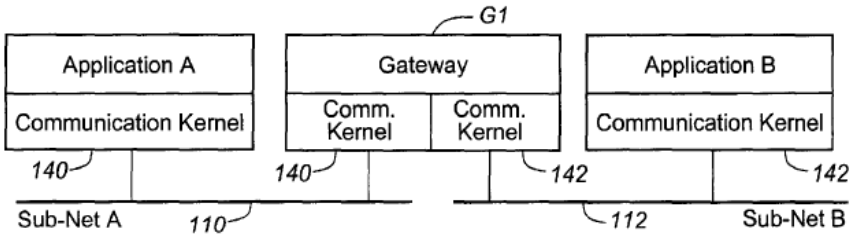


Fig. 9

Figure 9 depicts Gateway G1 comprising two interfaces, Comm. Kernel 140 ("communication kernel") and Comm. Kernel 142, connected to two different networks, SubNet A and SubNet B. *Id.* at 13:22–27. SubNet A is connected via high-speed bus 110, and SubNet B is connected via low-speed bus 112. *Id.* at 12:27–30. Each communication kernel includes a data link layer ("DLL") and a physical layer that provides conversion of digital data symbols (i.e., 1's and 0's) generated by the data link layer into electrical signals transmitted on the bus. *Id.* at 12:42–51.

2. Wong

Wong, like Millsap and the Specification of the '705 patent, describes network communications in automobiles. Ex. 1012, 62. Wong discloses that "[v]ehicles will be home for some of the most diverse network and multiprocessing technology over the next five years," and that "[s]tandards will help improve acceptance and reduce costs." *Id.* "Leading the

standardization charge for networks in automotive environments in the Controller Area Network (CAN) . . . providing a standard for real-time operating systems for the many embedded processors found in automotive networks." *Id.*

Wong discloses further that CAN is not the only kind of network used in automobiles. "At the low end, the Local Interconnect Network (LIN) is being employed," and "[a] variety of multimedia networks are undergoing evaluation too, including a modified version of the IEEE-1394 standard to allow operation in a more hostile environment." *Id.* (emphasis omitted). Wong provides a table listing various automobile networking standards, including, for example, CAN, CAN-A, CAN-B, CAN-C, LIN, and FlexRay. *Id.* at 66. According to Wong, "[t]he vehicle of the future will contain a variety of networks tied together primarily for management and diagnostic support. . . . One or more gateways will link various network segments." *Id.* at 64 (Fig. 1).

3. Analysis

To address elements 7.8–7.10 of independent claim 7, Petitioner relies on Millsap's disclosure of ECUs in vehicle control system networks. *Id.* at 60–61. Millsap's ECUs are connected to one or more networks. Ex. 1015, 1:6–10, 2:41–46, 12:20–36, 12:42–44, Fig. 8. Specifically, Petitioner relies on Millsap's disclosure of a gateway ECU comprising two communications kernels connected to different networks as described above. Pet. 59–66.

According to Petitioner, a skilled artisan would have been motivated to incorporate the ECU in Millsap into the OSEK/VDX system to interface between different busses. *Id.* at 60–61. Petitioner enumerates several reasons for effecting the combination, including that (1) they are from the same field, related to real-time distributed communication and control of automotive ECUs; (2) the combination would have been predictable and yielded no unexpected results; and (3) OSEK COM expressly directs that other unlisted networks may be used, Ex. 1008, 11 ("This interface is independent of the bus system used hence allowing for application software asset re-use across different bus platforms."). *Id.* at 61–63. Particularly persuasive is Petitioner's argument that OSEK/VDX describes a system that implements a multilayer network interface, and Millsap describes a data link layer that "was one of many well-known and well-understood interface designs for providing data from a bus to a computing resource." *Id.* at 62. Petitioner supports its assertion that a person of ordinary skill in the art "would have known [the data link layer of Millsap] could be used in place of the data link layer of OSEK/VDX" with testimony by Dr. Madisetti. *Id.* (citing Ex. 1003 ¶ 203). Petitioner's reasoning is adequately supported by rational underpinning. *See KSR*, 550 U.S. at 418.

Patent Owner disputes this aspect of Petitioner's analysis, asserting that "Petitioner has attempted to combine several references, using conclusory statements and reference descriptions having a high level of abstraction." PO Resp. 39 (citing Ex. 2001 ¶ 96). We disagree that

Petitioner's characterizations use an inappropriately "high level of abstraction." Rather, Petitioner's description of the fields of both OSEK/VDX and Millsap as "relate[d] to real-time distributed communication and control of automotive ECUs" is both reasonably narrow and accurate. *See* Pet. 61. In particular, we disagree with Patent Owner's assertion that Petitioner has "abstracted the teach[ings] of the references to the point where they merely describe the technical field they refer to and ignore all of the significant differences that relate to how the systems are configured in order to achieve different goals." PO Resp. 39. As discussed above, Petitioner provides a clear proposal that one of skill in the art would understand the data link layer of Millsap could be used in place of the data link layer of OSEK/VDX. *See KSR*, 550 U.S. at 416 ("when a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result").

Petitioner relies on Wong to support its argument regarding the understanding of a skilled artisan as to which networks, in addition to CAN networks, would have been used in an automobile at the time of the invention. Pet. 63–67. Specifically, Petitioner argues that Wong supports its position that a skilled artisan would have understood that such other networks would have included LIN and FlexRay. *Id.* at 63.

Petitioner also provides sufficient rationale for combining Wong with OSEK/VDX and Millsap. *Id.* at 64–67. In pertinent part, OSEK/VDX and

Millsap relate to passing messages between different networks in automobiles, and Wong provides a description of various known networks used in automobiles at the time. *Id.* Petitioner argues the combination would have yielded predictable results, namely, ensuring support for additional networks and protocols. *Id.* at 65.

Accordingly, having reviewed Petitioner's evidence and arguments, and having considered Patent Owner's arguments, we conclude that Petitioner shows, by a preponderance of the evidence that independent claim 7 is unpatentable under 35 U.S.C. § 103(a) over OSEK/VDX, Millsap, and Wong. Additionally, because we find that Petitioner adequately identifies the features of challenged dependent claims 8–14 and 16–19 as disclosed by OSEK/VDX, we conclude that Petitioner shows, by a preponderance of the evidence, that those claims are also unpatentable under 35 U.S.C. § 103(a) over OSEK/VDX, Millsap, and Wong.

I. 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. 42–43. 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, 1370 (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.").

J. Estoppel

Petitioner argues that under 37 C.F.R. § 42.73(d)(3)(i) Patent Owner is estopped from arguing any claim not patentably distinct from those held unpatentable. Reply 2. Rule 42.73(d)(3) states "[a] patent applicant or owner is precluded from taking action inconsistent with the adverse judgment, including obtaining in any patent: (i) [a] claim that is not patentably distinct from a finally refused or canceled claim." Because we conclude that Petitioner has made a sufficient showing with respect to all challenged claims, even considering Patent Owner's arguments, we do not reach this issue.

III. ORDER

It is

ORDERED that, based on a preponderance of the evidence, claims 7–14 and 16–19 of U.S. Patent No. 8,209,705 B2 are held to be unpatentable; and

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

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