

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS, INC.,
Petitioner,

v.

PORTSMOUTH NETWORK CORP.,
Patent Owner.

IPR2024-00505
Patent 6,917,986 B2

Before ST. JOHN COURTENAY III, JUSTIN T. ARBES, and
CHARLES J. BOUDREAU, *Administrative Patent Judges*.

ARBES, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining Some Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

A. Background and Summary

Petitioner Cisco Systems, Inc. filed a Petition (Paper 2, “Pet.”) requesting *inter partes* review of claims 1, 2, 4–7, 9–14, 16–19, and 21–24 of U.S. Patent No. 6,917,986 B2 (Ex. 1001, “the ’986 patent”) pursuant to

35 U.S.C. § 311(a). On August 6, 2024, the Board instituted an *inter partes* review as to all challenged claims on all grounds of unpatentability asserted in the Petition. Paper 7 (“Decision on Institution” or “Dec. on Inst.”).

Patent Owner Portsmouth Network Corp. filed a Patent Owner Response (Paper 11, “PO Resp.”), Petitioner filed a Reply (Paper 20, “Reply”), and Patent Owner filed a Sur-Reply (Paper 24, “Sur-Reply”). An oral hearing was held on May 5, 2025, and a transcript of the hearing is included in the record (Paper 28, “Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). For the reasons that follow, we determine that Petitioner has shown, by a preponderance of the evidence, that claims 1, 2, 4–7, 9, 10, 13, 14, 16–19, 21, and 22 of the ’986 patent are unpatentable, but has not shown, by a preponderance of the evidence, that claims 11, 12, 23, and 24 of the ’986 patent are unpatentable.

B. Related Matters

The parties indicate that the ’986 patent was the subject of *Portsmouth Network Corp. v. Cisco Systems, Inc.*, No. 23-cv-00441 (E.D. Tex.) (“the district court case”), which has been dismissed, and is the subject of *Portsmouth Network Corp. v. Juniper Networks, Inc.*, 23-cv-12201 (D. Mass), which has been stayed. *See* Pet. 104; Paper 4, 2. Petitioner filed petitions challenging other patents asserted in the district court cases in IPR2024-00503 (instituted), IPR2024-00506 (instituted), IPR2024-00954 (denied), and IPR2024-01450 (instituted). A different petitioner filed a petition challenging claims 1–24 of the ’986 patent in IPR2024-00893 (instituted) and petitions challenging other patents asserted in the district

court cases in IPR2024-00913 (instituted) and IPR2024-00989 (instituted and consolidated with IPR2024-00913).

C. The '986 Patent

The '986 patent, titled “Fast Failure Protection Using Redundant Network Edge Ports,” issued July 12, 2005, from U.S. Patent Application No. 10/036,518, filed on January 7, 2002. Ex. 1001, codes (21), (22), (45), (54). The '986 patent relates to “methods and devices [for] enabling rapid reconfiguration in response to network topology changes” or “rapid recovery from network failures.” *Id.* at col. 3, ll. 58–64. The goal of the '986 patent was to find a way to recover rapidly from a failure in a network that uses a spanning tree protocol to avoid loops in redundant network paths. *Id.* at col. 2, l. 65–col. 3, l. 14, col. 3, ll. 58–64.

More specifically, the “Background of the Invention” section of the '986 patent describes:

To protect against failures of network equipment and communication media, it is common to provide multiple, redundant paths between switches in the network. For example, [] switches are typically connected . . . by dual links. These links may be in the form of connections between each of a pair of ports on one [] switch with a corresponding pair of ports on [another] switch. . . . [T]hese configurations are meant to ensure the connection between the [first switch] and [a second] switch will be maintained even if there is a failure in one of the ports

Ex. 1001, col. 2, ll. 7–22. “A problem with redundant topologies, however, is that the multiple paths between points in the network can create loops that disrupt the proper functioning [B]roadcast packets may be forwarded repeatedly by the switches in the loop, causing a serious problem of network congestion, known as a ‘broadcast storm.’” *Id.* at col. 2, ll. 23–29. “In order

to avoid these problems, the 802.1D standard defines a communication protocol, known as the spanning tree protocol (STP), for managing the creation and updating of the network topology. STP ensures that all data paths in a network of bridges^[1] are free of loops by disabling forwarding of packets through certain [ports].” *Id.* at col. 2, ll. 30–36. “The spanning tree algorithm defines one bridge in the network as the root bridge. Each LAN connected to the network has a bridge port that connects it to the root bridge.” *Id.* at col. 2, ll. 48–50. Therefore, “[e]ach bridge has a port defined as its root port, which uniquely connects that bridge to the root bridge [or switch].”² *Id.* at col. 2, ll. 55–56. The other ports on the switch (bridge) that do not connect to the root switch “are put into the blocking state.” *Id.* at col. 2, ll. 56–58. “Frames destined to cross the network will thus travel from the designated bridge of the originating LAN along a root path toward the root bridge. If the destination bridge does not lie along the root path, the frame will be routed through the root bridge” *Id.* at col. 2, ll. 58–64. The ’986 patent Specification goes on to describe that networks implementing an STP can take a long time to recover from a link failure:

Although STP is effective in removing network loops, it is very slow in adapting to topology changes that may occur when a network link fails or is subsequently restored. Responding to a failure typically necessitates recalculating the spanning tree to

¹ A network switch that connects various components of networks together is a type of bridge, one that has multiple ports on it which, in turn, can each be connected to a port on another switch, local area networks (LANs), wide area networks (WANs), or other devices. Ex. 1001, col. 1, ll. 27–29.

² Note that the connection from the root port on a switch to the root switch (bridge) does not necessarily have to be a direct connection but can be a path going through other switches. Ex. 1001, col. 2, ll. 48–64. The path from a particular switch toward the root switch is called the root path or designated path. *Id.*

accommodate the topology change and accordingly transferring [the] bridge ports from the blocking to the forwarding state. The [] 802.1D standard specifies a procedure for responding to topology changes, which include reducing the aging time for filtering database entries to 15 sec. Using this procedure with default STP timing parameters, . . . it still takes 30 sec to transfer ports from the blocking state to the forwarding state.

Id. at col. 2, l. 65–col. 3, l. 10.

Accordingly, the '986 patent describes that it “is an object of some aspects of the present invention to provide methods and devices enabling rapid reconfiguration in response to network topology changes.” Ex. 1001, col. 3, ll. 57–59. In order to do this, the '986 patent describes a preferred embodiment as follows:

[A]n edge switch . . . is attached by redundant links to one or more access switches. The edge switch selects one of its access ports (i.e., the ports that are connected to the downstream links to the access switches) to be its active access port, while placing its remaining access port(s) in the blocking state. . . .

When the edge switch detects a failure in its active link to the access switches, it immediately chooses one of the blocked links to serve as the new active link and blocks the failed port. In order to inform the access switches and other downstream equipment that they should now transmit their upstream traffic through the new active link, the edge switch sends dummy frames through the new active link to the access switches. . . . Upon receiving these dummy frames, the access switches . . . rebuild their own filtering databases so that upstream traffic is immediately directed to the new active link.

Id. at col. 3, l. 65–col. 4, l. 28.

Figure 2A, illustrating a preferred embodiment, is reproduced below.

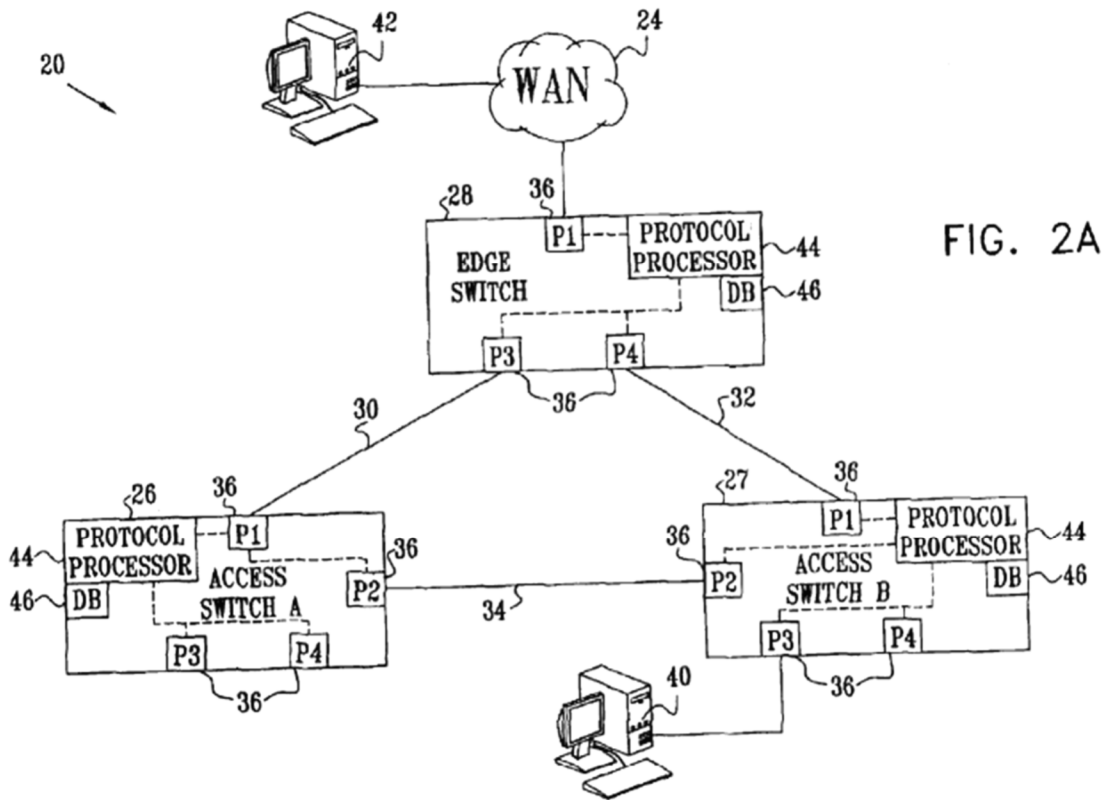


Figure 2A is “a block diagram that schematically shows details of the interconnection of switches 26, 27 and 28, in accordance with a preferred embodiment of the present invention.” Ex. 1001, col. 7, ll. 53–56. “[W]hen users 40 and 42 attempt to communicate over network 20, all the traffic between them will pass through switch 26, via links 30 and 34.” *Id.* at col. 8, ll. 62–64. “The method [of the invention] is invoked when processor 44 of switch 28 senses a failure at port P3, . . . referred to [] as the primary port, i.e., the port that is used originally at switch 28.” *Id.* at col. 9, ll. 14–18.

“Upon sensing the failure, processor 44 of edge switch 28 blocks its port P3 and activates its port P4 instead.” Ex. 1001, col. 9, ll. 26–28. “Now edge switch 28 and access switch 27 can immediately begin exchanging

traffic over link 32.” *Id.* at col. 9, ll. 34–35. “The filtering databases maintained by the switches are no longer accurate . . . [Switch 26] will not begin sending traffic over links 34 and 32 . . . until its filtering database has been updated. Communication is delayed for as long as the database entries are incorrect.” *Id.* at col. 9, ll. 35–41. “In order to shorten this delay, edge switch 28 sends dummy frames downstream to access switch 27 via link 32.” *Id.* at col. 9, ll. 42–44. “When switch 27 receives the dummy frame, it also forwards it to switch 26.” *Id.* at col. 9, ll. 56–57. “Once the dummy frame has been sent, switches 26, 27 and 28 update their filtering databases to reflect the change in the active link from link 30 to link 32” *Id.* at col. 9, ll. 62–65. Sending the dummy frames allows all of the switches to rapidly update their filtering databases after a port failure and switchover so the network can recover more quickly. *Id.* at col. 4, ll. 24–31.

The ’986 patent describes what constitutes access switches, core switches, and edge switches. Access switches have “ports that connect to LANs and/or to other network endpoints, such as user computer systems.” Ex. 1001, col. 1, ll. 31–33. A core switch “interconnect[s] the access switches into a Wide Area Network (WAN), by direct connection between the core switch and access switches and/or by connection to other core switches.” *Id.* at col. 1, ll. 33–36. Edge switches are “[c]ore switches that are directly connected to access switches.” *Id.* at col. 1, ll. 36–38.

Applying these definitions to Figure 2A, switches 26 and 27 are “access switches” because they are connected to network endpoints or LANs as shown in Figure 2A’s depiction of switch 27 being connected to end user/computer system 40. Ex. 1001, col. 7, ll. 52–61, Fig. 1. Switch 28 is an “edge switch” because it is a “core switch” that is “directly connected to access switches”—i.e., it is directly connected to access switches 26 and 27,

and also connected to WAN 24, so it connects the access switches to the WAN. *Id.* at col. 1, ll. 36–38.

D. Illustrative Claims

Challenged claims 1, 12, 13, and 24 of the '986 patent are independent. Claims 2, 4–7, and 9–11 depend from claim 1, and claims 14, 16–19, and 21–23 depend from claim 13. Claims 1 and 12 recite (with letter designations used in the Petition to refer to the various limitations):

1. [pre] A method for network communication, comprising:

[a] coupling an edge switch in a network to one or more access switches via at least first and second redundant links, respectively connected to first and second ports of the edge switch;

[b] placing the first port in an active state, while placing the second port in a blocking state;

[c] conveying communication traffic over the first link while the first port is in the active state, thereby causing each of the switches to build a respective database for use in forwarding the traffic;

[d] responsive to a failure associated with the first link, placing the second port in the active state and the first port in the blocking state; and

[e] sending dummy traffic from the edge switch over the second link to the one or more access switches, so as to cause each of the one or more access switches to modify its respective database responsive to the second port being in the active state.

12. [pre] A method for network communication, comprising:

[a] coupling a first bridge in a network to a second bridge located downstream of the first bridge, by connecting at least first and second redundant links to respective first and second ports of the first bridge so as to communicate with the second bridge;

[b] placing the first port in an active state, while placing the second port in a blocking state;

[c] conveying communication traffic over the first link while the first port is in the active state, thereby causing the bridges to build respective databases for use in forwarding the traffic;

[d] responsive to a failure associated with the first link, placing the second port in the active state and the first port in the blocking state; and

[e] sending dummy traffic from the first bridge over the second link downstream to the second bridge, so as to cause the second bridge to modify its database responsive to the second port being in the active state.

E. Evidence

The pending ground of unpatentability in the instant *inter partes* review is based on U.S. Patent No. 6,032,194, issued Feb. 29, 2000 (Ex. 1005, “Gai”). Petitioner filed a declaration from Henry H. Houh, Ph.D. (Ex. 1003) with its Petition. Patent Owner filed a declaration from James Olivier, Ph.D. (Ex. 2001) with its Response. Also submitted as evidence are transcripts of the depositions of Dr. Houh (Ex. 2002) and Dr. Olivier (Ex. 1018).

F. Asserted Ground

Petitioner asserts that claims 1, 2, 4–7, 9–14, 16–19, and 21–24 of the '986 patent would have been obvious on the basis of a prior art printed publication under 35 U.S.C. § 103(a):³

Claims Challenged	35 U.S.C. §	Reference/Basis
1, 2, 4–7, 9–14, 16–19, 21–24	103(a)	Gai

II. ANALYSIS

A. Level of Ordinary Skill in the Art

In determining the level of ordinary skill in the art for a challenged patent, we look to “1) the types of problems encountered in the art; 2) the prior art solutions to those problems; 3) the rapidity with which innovations are made; 4) the sophistication of the technology; and 5) the educational level of active workers in the field.” *Ruiz v. A.B. Chance Co.*, 234 F.3d 654, 666–67 (Fed. Cir. 2000). “Not all such factors may be present in every case, and one or more of them may predominate.” *Id.* at 667.

Petitioner argues that at the time of the application for the '986 patent (January 2002), a person of ordinary skill in the art would have had “a bachelor’s degree in computer science, computer engineering, electrical engineering, or in an equivalent field, or approximately two years of experience working in the field of information technology and networking,” where “[l]ack of professional experience can be substituted by additional

³ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. § 103. Because the challenged claims of the '986 patent have an effective filing date before the effective date of the applicable AIA amendment, we refer to the pre-AIA version of 35 U.S.C. § 103. *See* Ex. 1001, code (22).

education, and vice versa.” Pet. 11 (citing Ex. 1003 ¶ 72). In the Decision on Institution, the Board agreed with and applied Petitioner’s proposed definition. Dec. on Inst. 22. Patent Owner uses the same definition for its Response. PO Resp. 6. Based on the full record developed during trial, including our review of the ’986 patent and the types of problems and solutions described in the ’986 patent and cited prior art, we maintain the previously adopted definition of the level of ordinary skill in the art and apply it for purposes of this Decision.

B. Claim Interpretation

We interpret the claims of the challenged patent

using the same claim construction standard that would be used to construe the [claims] in a civil action under 35 U.S.C. 282(b), including construing the [claims] in accordance with the ordinary and customary meaning of such [claims] as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.

37 C.F.R. § 42.100(b). Petitioner states that “no claim term requires express construction.” Pet. 11–12. Patent Owner states that its arguments “do not rely on any proposed construction,” but notes Petitioner’s proposed constructions for the terms “access switch” and “edge switch” in the district court case. PO Resp. 5. Specifically, Petitioner argued in the district court case that “access switch” means a “switch with ports that connect to LANs and/or to other network endpoints” and “edge switch” means a “core switch that is directly connected to (an) access switch(es).” *Id.* (quoting Ex. 2004, 3, 5). The Board did not interpret any terms in the Decision on Institution. Dec. on Inst. 22–23. Given the parties’ arguments during trial, however,

we address four claim terms: “access switch,” “edge switch,” “downstream,” and “upstream.”

“Access switch” and “edge switch” appear in independent claims 1 and 13, as well as numerous claims depending therefrom. For example, claim 1 recites “coupling an *edge switch* in a network to one or more *access switches* via at least first and second redundant links, respectively connected to first and second ports of the *edge switch*,” and “sending dummy traffic from the *edge switch* over the second link to the one or more *access switches*, so as to cause each of the one or more *access switches* to modify its respective database responsive to the second port being in the active state” (emphasis added).

The Specification of the ’986 patent discloses the following in the “Background of the Invention” section:

The most common type of MAC bridge is a switch, which has multiple ports connecting it to LANs, other switches, host computing systems, or other network elements. Switches can be roughly classified as access switches or core switches. An access switch has ports that connect to LANs and/or to other network endpoints, such as user computer systems. Core switches interconnect the access switches into a Wide Area Network (WAN), by direct connection between the core switch and access switches and/or by connection to other core switches. Core switches that are directly connected to access switches are referred to herein as edge switches.

Ex. 1001, col. 1, ll. 27–38. Both parties refer to this disclosure when arguing whether particular switches in the asserted prior art (Gai) qualify as an “access switch” or “edge switch.” See Pet. 5, 22, 27–28 (“edge switches are ‘[c]ore switches that are directly connected to access switches’”), 71; PO Resp. 31–32 (“The ’986 patent discloses that ‘[a]n access switch has ports that connect to LANs and/or to other network endpoints.’ . . . The

'986 patent also discloses that edge switches are “[c]ore switches that are directly connected to access switches.”); Reply 20, 22. Dr. Houh and Dr. Olivier do so as well. *See* Ex. 1003 ¶¶ 39, 66–67, 82–83, 166, 171, 193; Ex. 2001 ¶ 80. Based on the full trial record, we agree and conclude that the descriptions of “access switch” and “edge switch” in the '986 patent reflect what was understood to be the plain and ordinary meanings of these terms at the time of the invention. Accordingly, we interpret “access switch” to mean a switch with ports that connect to LANs and/or to other network endpoints, such as user computer systems, and interpret “edge switch” to mean a core switch that is directly connected to an access switch.

The parties also agree as to the terms “downstream” and “upstream,” which appear in claims 11, 12, 23, and 24. Independent claim 12, for example, recites “coupling a first bridge in a network to a second bridge located *downstream* of a first bridge” and “sending dummy traffic from the first bridge over the second link *downstream* to the second bridge” (emphasis added). Independent claim 24 recites a bridge device comprising “a designated port, adapted to be coupled over an *upstream* link in the network *so as to communicate with the root*,” and “first and second *downstream* ports, adapted to be coupled via first and second redundant links to a further bridge device located *downstream* in the network *relative to the spanning tree root*” (emphasis added). Dependent claims 11 and 23 similarly recite “downstream” communication of dummy traffic.

The parties agree that, in the context of the '986 patent, “downstream” means *away* from the root switch and “upstream” means *toward* the root switch. *See* Pet. 73 (“‘downstream of the first bridge,’ i.e., away from the root switch” (emphasis omitted)); PO Resp. 12 (“toward the root (i.e. upstream”), 17; Reply 11 (“away from the root switch (*i.e.*, downstream)”),

19; Sur-Reply 3–5 (“upstream towards the root switch” (emphasis omitted)); Tr. 14:11–16. That view is consistent with the usage of the terms in the Specification of the ’986 patent. *See, e.g.*, Ex. 1001, col. 3, ll. 21–33 (stating that in Gai, the switch “trunk ports are on the upstream side of each switch, i.e., the side leading toward the root,” and in Gai’s disclosed method, the switch “transmits dummy multicast messages toward the root (upstream)”), col. 3, l. 65–col. 4, l. 43 (discussing “downstream” communication and “downstream” versus “upstream” ports). Based on the full trial record, we interpret “downstream” to mean away from the root switch and “upstream” to mean toward the root switch.

No other terms require express interpretation to determine whether Petitioner has met its burden to prove unpatentability of the challenged claims. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“Because we need only construe terms ‘that are in controversy, and *only to the extent necessary* to resolve the controversy,’ we need not construe [a particular claim limitation] where the construction is not ‘material to the . . . dispute.’” (emphasis added) (citation omitted)).

C. Legal Standards

To prevail in its challenge to the patentability of claims 1, 2, 4–7, 9–14, 16–19, and 21–24 of the ’986 patent, Petitioner must demonstrate that the claims are unpatentable by a preponderance of the evidence. 35 U.S.C. § 316(e). “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). This burden of persuasion never shifts to Patent Owner.

Dynamic Drinkware, LLC v. Nat'l Graphics, Inc., 800 F.3d 1375, 1378 (Fed. Cir. 2015); *see also In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1376 (Fed. Cir. 2016) (“Where, as here, the only question presented is whether due consideration of the four *Graham* factors renders a claim or claims obvious, no burden shifts from the patent challenger to the patentee.”).

A claim is unpatentable for obviousness if, to one of ordinary skill in the pertinent art, “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made.” *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007) (quoting 35 U.S.C. § 103(a)). The question of obviousness is resolved on the basis of underlying factual determinations, including “the scope and content of the prior art”; “differences between the prior art and the claims at issue”; and “the level of ordinary skill in the pertinent art.” *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). Additionally, objective indicia of nonobviousness, such as “commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy.”⁴ *Id.* When conducting an obviousness analysis, we consider a prior art reference “not only for what it expressly teaches, but also for what it fairly suggests.” *Bradium Techs. LLC v. Iancu*, 923 F.3d 1032, 1049 (Fed. Cir. 2019) (citation omitted).

⁴ Patent Owner does not present any evidence of objective indicia of nonobviousness in this proceeding.

A patent claim “is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR*, 550 U.S. at 418. An obviousness determination based on a combination of references requires finding “both ‘that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.’” *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367–68 (Fed. Cir. 2016) (quoting *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1360 (Fed. Cir. 2012)); see *KSR*, 550 U.S. at 418 (for an obviousness analysis, “it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does”). Also, “[t]hough less common, in appropriate circumstances, a patent can be obvious in light of a single prior art reference if it would have been obvious to modify that reference to arrive at the patented invention.” *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1361 (Fed. Cir. 2016).

“Although the *KSR* test is flexible, the Board ‘must still be careful not to allow hindsight reconstruction of references . . . without any explanation as to *how* or *why* the references would be combined to produce the claimed invention.’” *TriVascular, Inc. v. Samuels*, 812 F.3d 1056, 1066 (Fed. Cir. 2016) (quoting *Kinetic Concepts*, 688 F.3d at 1368). Further, an assertion of obviousness “cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR*, 550 U.S. at 418 (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)); accord *In re NuVasive, Inc.*, 842 F.3d 1376, 1383 (Fed. Cir. 2016) (stating that “conclusory

statements” amount to an “insufficient articulation[] of motivation to combine”; “instead, the finding must be supported by a ‘reasoned explanation’” (quoting *In re Lee*, 277 F.3d 1338, 1342 (Fed. Cir. 2002)); *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016) (“To satisfy its burden of proving obviousness, a petitioner cannot employ mere conclusory statements. The petitioner must instead articulate specific reasoning, based on evidence of record, to support the legal conclusion of obviousness.”).

D. Obviousness Ground Based on Gai

Petitioner argues that claims 1, 2, 4–7, 9–14, 16–19, and 21–24 are unpatentable over Gai under 35 U.S.C. § 103(a). Pet. 12–96. As explained in the Decision on Institution, Petitioner advances two alternative theories as to how the claims are allegedly unpatentable over Gai alone, which Petitioner refers to as Ground “1A” and Ground “1B.” *See* Pet. 25, 68; Dec. on Inst. 23 n.8. We address the parties’ arguments regarding both theories below.

1. Gai

Gai is a U.S. patent titled “Method and Apparatus for Rapidly Reconfiguring Computer Networks.”⁵ Ex. 1005, code (54). Similar to the ’986 patent, Gai also describes a method for rapidly recovering from a switch port or link failure in a network that implements a spanning tree protocol/algorithm. *Id.* at code (57) (“A method that rapidly reconfigures a

⁵ The ’986 patent refers to Gai by number and states that Gai’s “disclosure is incorporated herein by reference.” Ex. 1001, col. 3, ll. 15–41, col. 4, ll. 32–43.

computer network having a plurality of devices executing the spanning tree algorithm.”).

Gai describes that “one or more devices are configured and arranged so that one port, providing connectivity to the root, is in the forwarding state and the remaining ports, providing connectivity to the root, are in the blocked state.” Ex. 1005, code (57). “Upon detection of a failure at the active forwarding port, one of the back-up ports immediately transitions from blocked to forwarding, thereby becoming the new active port for the device.” *Id.* “[D]ummy multicast messages are transmitted, each containing the source address of an entity directly coupled to the affected device or downstream thereof. By examining the dummy multicast messages, other devices in the network learn to use the new forwarding port of the affected device.” *Id.*

Figure 1 of Gai is reproduced below.

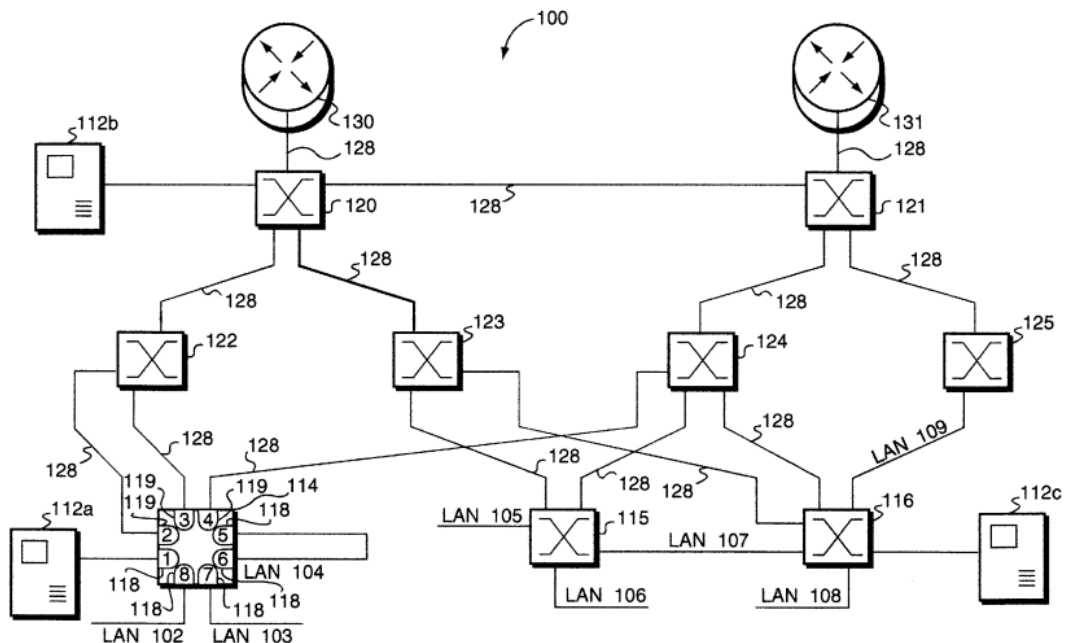


FIG. 1

Figure 1 depicts an embodiment of the invention implemented in computer network 100 with access switches 114–116 and backbone switches 120–125. Ex. 1005, col. 7, ll. 3–14. “[F]or each access switch 114–116, only one port . . . that represents a path from the access switch to the root . . . will be forwarding. All other ports . . . that represent paths from the access switch to the root will be blocked.” *Id.* at col. 11, ll. 8–13. “Should a . . . failure disabling the link coupled to a root port of an access switch [occur], the affected access switch will be able to rapidly reconfigure the network 100 without the significant interruption . . . experienced through conventional operation of the spanning tree algorithm.” *Id.* at col. 11, ll. 36–41.

“[A]ssume that port number three [on switch 114], which is coupled to backbone switch 122, is the root port for switch 114 and thus in the forwarding state.” Ex. 1005, col. 11, ll. 41–44. Because port 3 is active, the other ports on switch 114 that connect to the root switch (directly or indirectly) are blocked as explained by Gai:

[P]ort numbers two and four, which also connect switch 114 to the backbone switches [122 and 124], are in the blocked state. If the link 128 coupled to the port number three at switch 114 fails, either one of these other two ports (i.e., port numbers two or four) will immediately transition to the forwarding state and begin receiving and sending messages.

Id. at col. 11, ll. 44–52.

Gai then gives an example where backup port number 4 on switch 114 is chosen to replace port 3, which has the failed link to switch 122, by transitioning port 4 from a blocked state to a forwarding state. Ex. 1005, col. 12, ll. 13–23, 32–35. Gai continues explaining that “[s]witch 114 . . . preferably informs the other devices of its new forwarding port by

transmitting dummy multicast packets through the new port.” *Id.* at col. 12, ll. 62–66. When the dummy multicast messages are received at a new source port on backbone switch 124 that has a different route to network elements, such as to server 112a, switch 124 will update its filtering database to reflect the new information about the network. *See id.* at col. 13, ll. 34–38. Gai further explains that

[t]hereafter, if backbone switch 124 receives a message intended for server 112a, it will use this new destination port and the message will be received at port number four of switch 114, which is now capable of receiving and forwarding messages. Accordingly, the dummy multicast message [] effectively apprises backbone switch 124 of the change in forwarding ports that occurred at access switch 114. Backbone switch 124 distributes the multicast message [] through all of its forwarding ports so that other devices, as necessary, may learn of the new forwarding port (i.e., port number four) at access switch 114.

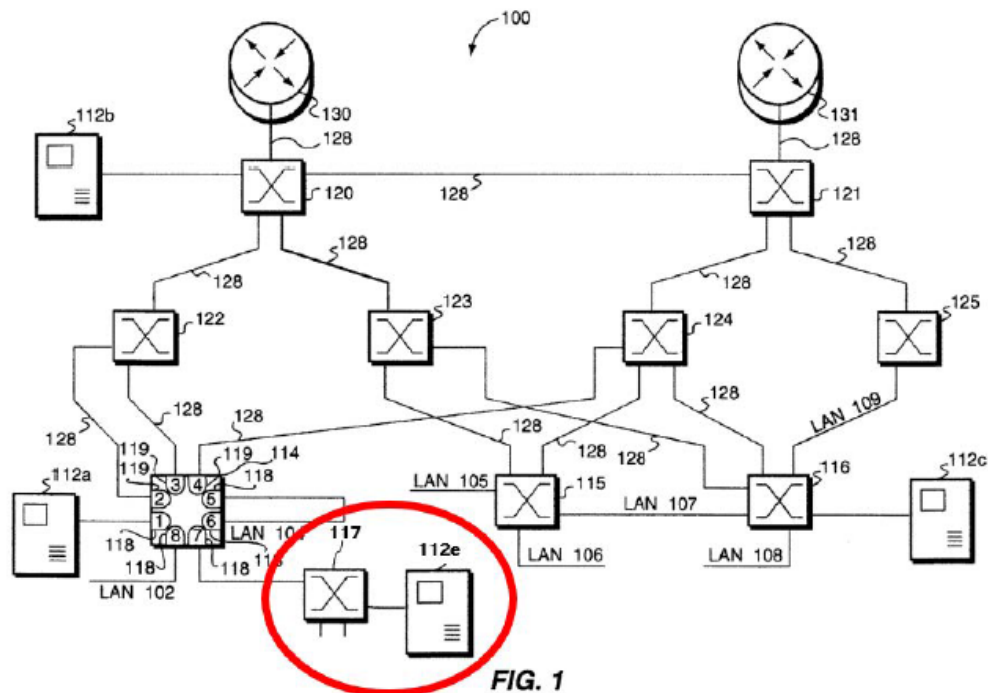
Id. at col. 13, ll. 38–49.

2. *Petitioner’s “1B” Arguments*

a) *Independent Claim 1*

We begin with Petitioner’s “1B” arguments, as they are more closely tied to Gai’s disclosure of “sending dummy packets *upstream*.” *See* Pet. 68.

Petitioner provides the following modified version of Figure 1 to illustrate what it contends Gai teaches (Pet. 69).



The modified figure above reproduces Figure 1 of Gai and adds two components circled in red: switch 117 (connected to port 7 of switch 114)⁶ and server 112e (connected to switch 117). *Id.* Petitioner argues that adding the components is appropriate based on Gai's disclosure in its written description that "if port number seven at switch 114 were coupled to another access switch, entity 234 would transmit multicast messages 400 carrying the source address of entities directly coupled to this additional access switch as well." *See* Ex. 1005, col. 13, ll. 59–63; Pet. 69–70; Ex. 1003 ¶ 165.

⁶ In the original Figure 1 of Gai, port 7 of switch 114 is connected to LAN 103.

(1) Undisputed Limitations

The preamble of claim 1 recites a “method for network communication.” Petitioner shows that Gai teaches such a method, regardless of whether the preamble is limiting. *See* Pet. 25–26, 70.

Limitation [1a] recites “coupling an edge switch in a network to one or more access switches via at least first and second redundant links, respectively connected to first and second ports of the edge switch.” Petitioner contends that Gai teaches an “edge switch” (i.e., switch 114), “one or more access switches” (i.e., switch 120), a “first redundant link” (i.e., link 128 connecting port 3 of switch 114 to switch 122), and a “second redundant link” (i.e., either link 128 connecting port 2 of switch 114 to switch 122, or link 128 connecting port 4 of switch 114 to switch 124). Pet. 70–73. Petitioner asserts that switch 114 is an “edge switch” because it is directly connected to an access switch (i.e., switch 117) and interconnects switch 117 into a WAN. *Id.* at 71 (citing Ex. 1001, col. 1, ll. 33–38).

The color versions of modified Figure 1 above show the alleged “edge switch” (switch 114 in blue), “access switch” (switch 120 in red), “first redundant link” (in purple), and “second redundant link” (in orange, between switches 114 and 122 in the first figure and between switches 114 and 124 in the second figure). *Id.* at 72–73.

Limitation [1b] recites “placing the first port in an active state, while placing the second port in a blocking state.” Petitioner contends that Gai teaches placing a “first port” (i.e., port 3 of switch 114) in an active state and placing a “second port” (i.e., port 2 or port 4 of switch 114) in a blocking state. Pet. 75–77. As described above, Gai discloses an embodiment in which port 3 on switch 114 is initially in the active (forwarding) state, connecting directly to switch 122. Ex. 1005, col. 11, ll. 36–52 (“With reference to switch 114, for example, assume that port number three, which is coupled to backbone switch 122, is . . . in the forwarding state.”). Because port 3 is in the active state, ports 2 and 4 of switch 114, which are redundant links (directly and indirectly, respectively) to switch 122, are initially in an inactive (blocked) state. *Id.* (“[P]ort numbers two and four, which also connect switch 114 to the backbone switches (i.e., backbone switches 122 and 124), are in the blocked state.”). Therefore, of the two ports on switch 122 that are directly connected to switch 114, one will initially be in the active state (the port directly connected to port 3 of switch 114), and the other will initially be in the inactive state (the one directly connected to port 2 or port 4 of switch 114). Additionally, the ’986 patent describes Gai as having a method where “[o]ne of the trunk ports of each switch is placed in the forwarding state, while the others are designated as back-up ports.” Ex. 1001, col. 3, ll. 24–26. A “trunk port” is a port that has a link connecting it to another switch. Ex. 1005, col. 1, ll. 43–44 (“Ports used to

couple switches to each other are generally referred to as [] trunk ports . . .”).

Limitation [1c] recites “conveying communication traffic over the first link while the first port is in the active state, thereby causing each of the switches to build a respective database for use in forwarding the traffic.”

According to Petitioner, Gai describes traffic initially flowing from port 3 of switch 114 over link 128 to switch 122. *See* Pet. 33–36, 75–77; Ex. 1005, col. 11, ll. 41–44. Gai makes clear that when ports are in the forwarding state, data frames, or communication traffic, is sent over the port. Ex. 1005, col. 2, ll. 56–63. Communication traffic received at a switch for the first time with an unknown source or destination address on the network will cause a database to be built on that switch. *Id.* at col. 11, ll. 16–33.

“Switches typically learn which destination port to use in order to reach a particular entity by noting on which source port the last message originating from that entity was received. This information is then stored by each switch in a block of memory referred to as a filtering database.” *Id.* at col. 1, ll. 50–54.

Petitioner also points to Gai’s description of filtering database 244 in switch 214. Pet. 34–35. “[F]iltering database 244 [is] configured to store address information corresponding to the entities of network 100.”

Ex. 1005, col. 8, ll. 32–34. “Specifically, filtering database 244 has a plurality of columns or cells, including a destination address cell [DA], a destination port [PORT], and a corresponding timer cell. Each row or entry in the filtering database 244 preferably corresponds to a particular entity.” *Id.* at col. 8, ll. 34–39. As described in reference to Figure 1, the first time a data frame is transmitted from port 3 of switch 114 to switch 122, switch 122 will check its filtering database and look to see if it has

switch 114 in the DA (destination address) field, so the first time a data frame is received from switch 114 there will be no entry, causing a new entry to be added with the corresponding active port added to the PORT field and network address for switch 114 to the DA field. *Id.* at col. 11, ll. 16–33. Once this entry is added, when switch 122 receives a data frame with the destination address for switch 114, it will see that it has that switch in the DA field in its filtering database, and therefore transmit the data frame out from the port specified by the PORT (which is the port that it last received a data frame from switch 114 on). *Id.*

Limitation [1d] recites “responsive to a failure associated with the first link, placing the second port in the active state and the first port in the blocking state.” Petitioner argues that Gai teaches, in response to a failure associated with the “first link” (i.e., link 128 from port 3 of switch 114), placing the “second port” (i.e., port 2 or port 4 of switch 114) in the active state and the “first port” (i.e., port 3 of switch 114) in the blocking state. Pet. 78–80.

Petitioner provides the following color versions of Figure 1 of Gai to illustrate its position (Pet. 78–79).

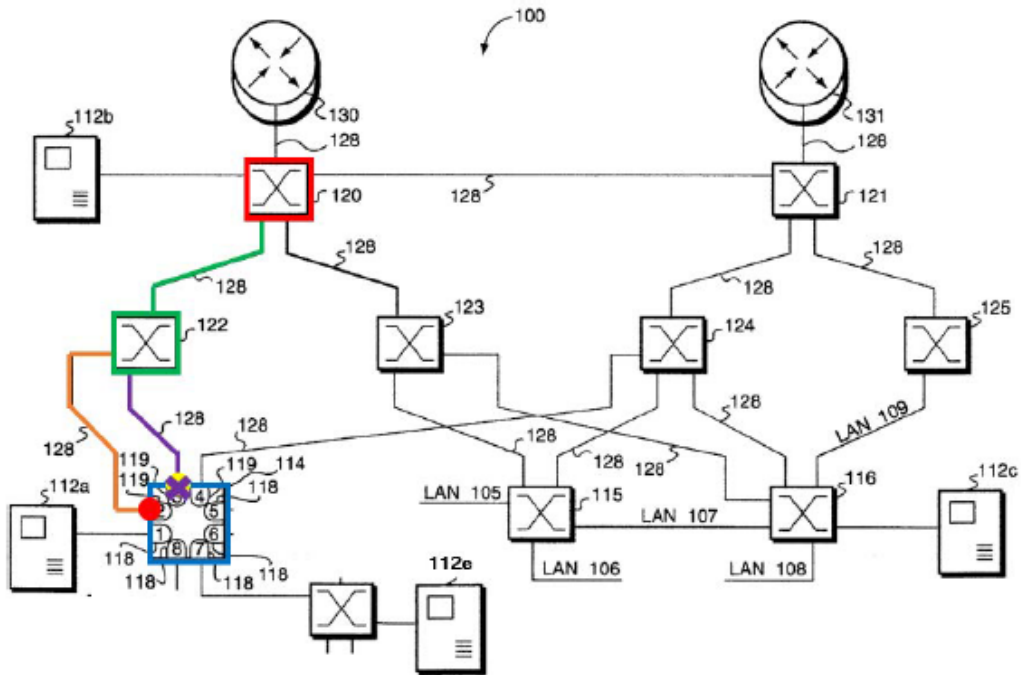


FIG. 1

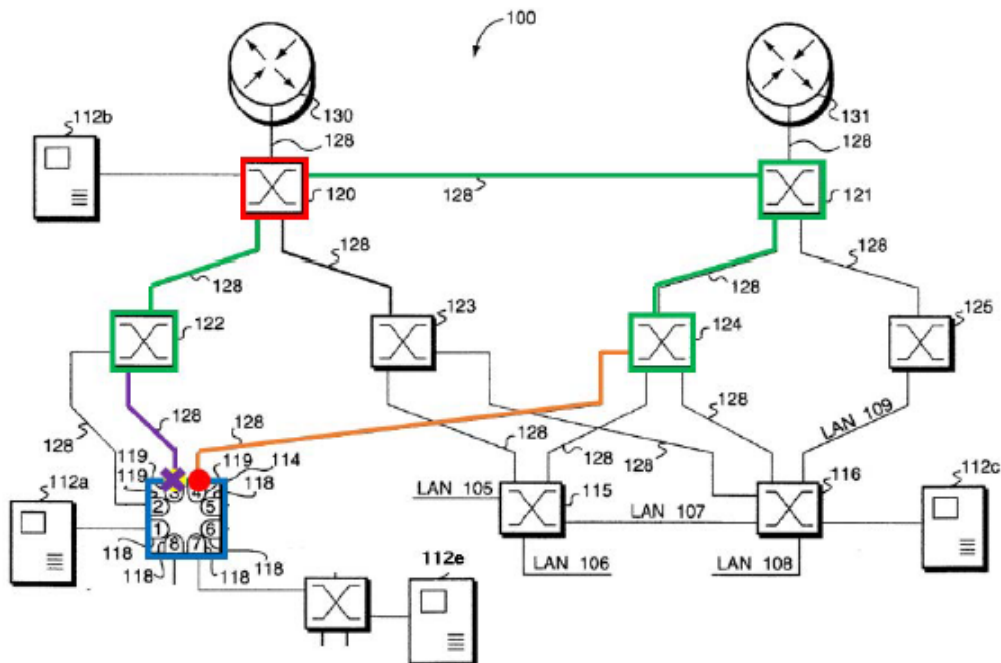


FIG. 1

The color versions of modified Figure 1 above show a failure on port 3 associated with the "first link" (in purple), in response to which back-up

port 2 or back-up port 4 (shown with a red dot) transitions to a forwarding state. *Id.*

Gai teaches that once link 128 from port 3 of switch 114 fails, port 3 will be placed in a blocked state, and one of the other root ports, either port 2 or port 4, will be placed in the active (forwarding) state:

[F]or example, assume that port number three [on switch 114], which is coupled to backbone switch 122, is the root port for switch 114 and thus in the forwarding state. . . . [P]ort numbers two and four, which also connect switch 114 to the backbone switches (i.e., backbone switches 122 and 124), are in the blocked state. If the link 128 coupled to the port number three at switch 114 fails, either one of these two other ports (i.e., port numbers two or four) will immediately transition to the forwarding state and begin receiving and sending messages.

Ex. 1005, col. 11, ll. 41–52. Gai further describes how port 4 could be selected as the new active root port for switch 114. *Id.* at col. 12, ll. 32–35. In that case, after recovering from a failure of the link coupled to port 3, switch 114 will now have root port 4 in the active state and ports 2 and 3 in the inactive state. *Id.* at col. 11, ll. 8–15. Because port 4 is directly connected to switch 124 (rather than switch 122, which is directly connected to port 3), the path that any upstream traffic from switch 114 will take will change. *Id.* at col. 12, ll. 56–59. Additionally, the '986 patent itself acknowledges that Gai teaches that, “[u]pon detection of a failure at the active forwarding port, the switch immediately places one of the back-up trunk ports in the forwarding state, so that it becomes the new active port.” Ex. 1001, col. 3, ll. 26–29.

Patent Owner in its Response does not dispute that Gai teaches the above limitations of claim 1. Petitioner’s analysis for each of the

limitations, supported by the testimony of Dr. Houh, which we credit, is persuasive. *See* Pet. 33–36, 70–80; Ex. 1003 ¶¶ 92–95, 167–172, 175–183.

(2) Disputed Limitation [1e]

Limitation [1e] recites “sending dummy traffic from the edge switch over the second link to the one or more access switches, so as to cause each of the one or more access switches to modify its respective database responsive to the second port being in the active state.” Relying on its modified version of Figure 1 shown above, where switch 114 becomes an “edge switch” due to the addition of switch 117, Petitioner argues that Gai teaches sending dummy traffic from the “edge switch” (i.e., switch 114) over the “second link” (i.e., link 128 from port 2 or port 4 of switch 114) that is further transmitted to “one or more access switches” (i.e., switch 120) to cause the access switch to modify its respective database (i.e., switch 120 updating its filtering database). Pet. 68–71, 81–85. As support, Petitioner points to Gai’s disclosure of transitioning from “initial” root port 3 to “back-up” root port 2 or port 4, where “the identity of the new root port . . . must be propagated to the other devices, such as . . . backbone switches 120–125 to prevent messages from being lost or misdirected,” and rapid reconfiguration entity 234 informs other devices of the change “by transmitting dummy multicast packets through the new port.” *Id.* at 81–82 (quoting Ex. 1005, col. 12, ll. 56–66) (emphasis omitted). Petitioner further argues that

Gai discloses “so as to cause each of the one or more access switches to modify its respective database responsive to the second port being in the active state” For example, when access switch 120 receives a dummy message from switch 121 with a source address corresponding to server 112a, it would

update its corresponding database, such that the next time switch 120 transmits a frame addressed to server 112a, it would use the appropriate port, e.g., the port to send the frame towards switch 121.

Id. at 85. Petitioner also notes the '986 patent's acknowledgment that Gai teaches transmitting dummy messages to other switches upstream. *Id.* at 81 (citing Ex. 1001, col. 3, ll. 29–35 (stating that in Gai, the switch “transmits dummy multicast messages toward the root (upstream) through the newly-active trunk port” and “[u]pon receiving these messages, other devices in the network learn to use the new active port”))).

Patent Owner argues in response that Petitioner's modified Figure 1 “fails to disclose sending [dummy] traffic to an access switch because switch 120 is still a backbone switch,” pointing to the fact that Gai refers to numbered components 120–125 as “backbone switches” and refers to other components as “access switches.” PO Resp. 34–36 (citing Ex. 1005, col. 7, ll. 8–10; Ex. 2001 ¶¶ 86–88); Sur-Reply 10–11. Patent Owner also cites an instance where Dr. Houh referred to switches 120–125 as “backbone switches.” PO Resp. 36 (citing Ex. 2002, 77:13–24).

We disagree with Patent Owner. What matters is not what terminology Gai uses to refer to switch 120, but rather whether that component qualifies as an “access switch” as recited in limitation [1e]. As Patent Owner acknowledges, “[a]n access switch has ports that connect to LANs and/or to other network endpoints, such as user computer systems.” *See* Ex. 1001, col. 1, ll. 31–33; PO Resp. 31; *supra* Section II.B. Switch 120 is an “access switch” because, as shown in Figure 1, it has a port that is connected to server 112b, and thus has “ports that connect to LANs and/or to other network endpoints, such as user computer systems.” *See* Pet. 71; Reply 22; Ex. 1005, col. 7, ll. 19–22 (“Network 100 further includes a

plurality of servers 112a–112c, such as file servers, print servers, etc. . . .”); Ex. 1003 ¶ 170. Indeed, Dr. Olivier agrees that switch 120 qualifies as an “access switch” since it is connected to server 112b. Ex. 1018, 85:10–86:7. Patent Owner does not propose an interpretation of “access switch” that would exclude a switch like switch 120 in Gai, nor does it explain why switch 120 can be considered *only* a “backbone switch,” given its various connections shown in the figure.

Petitioner’s “1B” analysis regarding limitation [1e], supported by the testimony of Dr. Houh, which we credit, is persuasive. *See* Pet. 81–85; Ex. 1003 ¶¶ 184–189.

(3) Patent Owner’s Other Arguments

Patent Owner makes a number of other arguments regarding claim 1. First, Patent Owner argues that Gai and the ’986 patent invention are “fundamentally different.” PO Resp. 8–12 (citing Ex. 2001 ¶¶ 35, 36, 38, 51, 53, 79, 91, 94); Sur-Reply 1–5. Patent Owner contrasts the embodiment shown in Figure 2A of the ’986 patent, where dummy traffic is transmitted downstream, with Gai, which in Patent Owner’s view is limited to “failure protection on an access switch by changing the root port” and “transmitting dummy multicast messages upstream towards the root.” PO Resp. 8–12; Sur-Reply 2–3. Patent Owner asserts that “Gai is ultimately incompatible with the requirements of the ’986 patent’s claimed inventions, which require the flexibility to transmit dummy traffic downstream or from an edge switch towards one or more access switches.” PO Resp. 12.

As explained in greater detail below, we agree with Patent Owner that Gai does not teach sending dummy traffic downstream away from the root switch. *See infra* Sections II.D.2.f, II.D.3.a. Claim 1, however, imposes

no limitation on the direction in which the dummy traffic is sent; the claim only requires that it be sent “from the edge switch over the second link to the one or more access switches.”⁸ *See* Pet. 20 (arguing that “only claims 11–12, and 23–24 recite . . . ‘downstream’ transmission of dummy traffic” and “the scope of claim 1 includes sending dummy traffic upstream” (emphasis omitted)), 68 (“not all claims require sending dummy packets downstream”), 73, 81, 85 (noting the difference between claim 1 and “downstream” claim 12). We are persuaded that Gai’s disclosure of switch 114 sending dummy traffic upstream to switch 120 teaches the limitation.

Second, Patent Owner argues that a person of ordinary skill in the art “would not have been motivated to modify Gai’s teachings . . . to send dummy traffic from the edge switch to one or more access switches.”⁹ PO Resp. 12–14 (citing Ex. 2001 ¶¶ 39, 42–46). Patent Owner further contends that there is no “basis or disclosure in Gai to support” Petitioner’s asserted modification to Figure 1 and Petitioner fails to provide a sufficient motivation for modifying the figure. Sur-Reply 5–8. Petitioner responds that its “1B” position is based on Gai’s express disclosure and is not a “modification” at all. Reply 10–11, 16–17.

⁸ By contrast, claims 11, 12, 23, and 24 expressly recite a direction in which the dummy traffic must be sent—“downstream”—and we do not agree with Petitioner’s reasoning as to those claims. *See infra* Section II.D.2.f. Also, claims 11 and 23 depend from claims 1 and 13, respectively, indicating that the parent claims are broader in scope and encompass more than “downstream” transmission.

⁹ Many of the parties’ arguments are interspersed with arguments pertaining to “downstream” claims 11, 12, 23, and 24, or Petitioner’s “1A” theory. *See, e.g.*, PO Resp. 12–14; Reply 8–12, 16–19; Sur-Reply 5–8. Here, we address the parties’ arguments only to the extent they relate to claim 1 and “1B.”

We agree with Petitioner. For purposes of claim 1, which does not recite “downstream” communication of dummy traffic (unlike claims 11, 12, 23, and 24), the only modification to Figure 1 is the addition of switch 117 and server 112e—otherwise, in Petitioner’s analysis, Gai’s method operates exactly as described when a failure occurs at root port 3 of switch 114. *See* Pet. 69–73, 81–85; Tr. 47:20–48:2. That modification is expressly supported by Gai, which discloses the following:

Rapid reconfiguration entity 234 similarly generates one or more separate multicast messages 400 for each remaining entity directly coupled to access switch 114 (i.e., entities or end stations on LANs 102–104). In each message 400, entity 234 loads SA field 414 with the address of the corresponding entity. Each of these messages are similarly forwarded by access switch 114 through the new forwarding port (i.e., port number four). In addition, entity 234 generates and transmits one or more multicast messages 400 for entities reachable through switch 114 on ports other than its root port. For example, *if port number seven at switch 114 were coupled to another access switch*, entity 234 would transmit multicast messages 400 carrying the source address of *entities directly coupled to this additional access switch* as well. Thus, at least one multicast message 400 is generated and transmitted for each entity directly coupled to or downstream of access switch 114 (relative to the root). As set forth above, upon receipt of these multicast messages 400, the other devices within network 100 update their corresponding filtering databases with the new destination ports, as necessary.

Ex. 1005, col. 13, l. 50–col. 14, l. 3 (emphasis added). Gai thus expressly contemplates the addition of “another access switch” coupled to port 7 of switch 114. Switch 117 in the modified Figure 1 is such a switch. *See* PO Resp. 30 (Patent Owner arguing that “a [person of ordinary skill in the art] would understand that switch 117 is an access switch”); Ex. 1018, 84:14–85:9 (Dr. Olivier agreeing that switch 117 is an “access switch”). And because an “access switch” has “ports that connect to LANs and/or to

other network endpoints, such as user computer systems,” and the above disclosure mentions “entities directly coupled to th[e] additional access switch,” switch 117 would be directly connected to a device like server 112e as well. *See* Ex. 1001, col. 1, ll. 31–33; Ex. 1005, col. 13, ll. 59–63; *supra* Section II.B. We credit Dr. Houh’s testimony that Gai in its written description expressly discloses the particular “variation of the topology” of Figure 1 that Petitioner asserts. *See* Ex. 1003 ¶ 165.

Third, Patent Owner argues that Petitioner has not established that a person of ordinary skill in the art “would have had a reasonable expectation of success in modifying Gai to meet the claims.” PO Resp. 14–16 (citing Ex. 2001 ¶¶ 47–49). Patent Owner’s arguments are primarily directed to Petitioner’s asserted modification for its “1A” theory. *See id.* To the extent Patent Owner’s arguments apply to claim 1 and “1B,” we disagree, as Gai expressly describes the asserted modification to Figure 1 (i.e., adding an access switch connected to port 7 of switch 114). Thus, we are persuaded that a person of ordinary skill in the art would have had a reasonable expectation of success in achieving the method of claim 1 based on Gai’s full disclosure.

(4) Conclusion

Based on all of the evidence of record, we determine that Petitioner has proven, by a preponderance of the evidence, that claim 1 would have been obvious over Gai under 35 U.S.C. § 103(a) based on Petitioner’s “1B” theory.

b) Independent Claim 13

Independent claim 13 is similar to claim 1, but recites a network switching device rather than a method. Petitioner largely refers to its earlier arguments regarding claim 1. *See* Pet. 87–90. Patent Owner likewise refers to its earlier arguments regarding claim 1, asserting that limitation [13f] is “substantially similar” to limitation [1e]. PO Resp. 36–37. We disagree with Patent Owner’s arguments for the reasons explained above. *See supra* Section II.D.2.a. Petitioner has proven, by a preponderance of the evidence, that claim 13 would have been obvious based on Gai under 35 U.S.C. § 103(a), for the reasons stated by Petitioner in its “1B” analysis. *See* Pet. 87–90; Ex. 1003 ¶¶ 191–198.

c) Dependent Claims 2, 4, 7, 9, 10, 14, 16, 19, 21, and 22

Patent Owner does not argue dependent claims 2, 4, 7, 9, 10, 14, 16, 19, 21, and 22 separately from their respective parent claims 1 and 13. *See* PO Resp. 38. We disagree with Patent Owner’s arguments regarding parent claims 1 and 13 for the reasons explained above. *See supra* Sections II.D.2.a–b. We have reviewed Petitioner’s contentions and supporting evidence, including the testimony of Dr. Houh, and are persuaded that Petitioner has proven, by a preponderance of the evidence, that claims 2, 4, 7, 9, 10, 14, 16, 19, 21, and 22 would have been obvious based on Gai under 35 U.S.C. § 103(a), for the reasons stated by Petitioner in its “1B” analysis. *See* Pet. 90–96; Ex. 1003 ¶¶ 130–136, 143–153, 156–163, 205–209, 214–219, 222–226.

d) Dependent Claims 5 and 17

Claim 4 depends from claim 1 and recites “responsive to placing the second port in the active state, updating the database of the edge switch so that entries in the database point to the second port instead of the first port.” Claim 5 depends from claim 4 and further limits the “updating” of claim 4, reciting that “updating the database” of the edge switch “comprises changing the entries in the database to point to the second port before receiving the communication traffic from the one or more access switches on the second port.” Similarly, claim 17, which depends from claim 16, recites that “the protocol processor is adapted to update the entries in the database to point to the second access port before receiving the communication traffic from the one or more access switches on the second port.”

For these claims, Petitioner argues that because switch 114 informs other devices of its new port by transmitting dummy messages through that new port, a person of ordinary skill in the art “would have understood that the contents, e.g., the port information, of the edge switch database would be updated to identify the new port for a particular entity, such that the dummy message(s) and/or communication messages would be transmitted from the appropriate port.” Pet. 55–56 (citing Ex. 1003 ¶¶ 133–136), 91–94. Further, “[b]ecause Gai discloses that the dummy messages are transmitted upon transition to the new forward port, a [person of ordinary skill in the art] would have understood that the dummy messages are transmitted before any communication traffic is received by the [edge] switch” and thus “the database entries would have been updated before receiving any communication traffic from the access switches.” *Id.* at 58 (citing Ex. 1003 ¶¶ 138–139). Petitioner cites a number of disclosures in Gai as allegedly supporting its position. *Id.* at 55–58.

In the Decision on Institution, the panel determined, based on the record at the time, that Petitioner had not established a reasonable likelihood of prevailing as to claims 5 and 17 due to the “before” timing language recited in the claims. Dec. on Inst. 57–59. The Decision specifically addressed Petitioner’s “1A” arguments, which map Gai’s switch 124 to the recited “edge switch,” and noted that the claim language “effectively means that switch 124 must update its database immediately upon transitioning to the new port either before or at the same time it transmits dummy messages to the access switches.” Dec. on Inst. 57–59.

Based on the full trial record, we are persuaded that Petitioner has made a sufficient showing with respect to claims 5 and 17. For its “1B” arguments, Petitioner contends that switch 114 is an “edge switch” and switch 120 is an “access switch.” *See* Pet. 71; *supra* Section II.D.2.a.(1). As Petitioner points out, Gai discloses that switches discard “old” information in their databases when a transition occurs from a blocked to a forwarding state. *See* Pet. 55; Ex. 1005, col. 4, ll. 30–34 (“As ports transition between the blocked and forwarding states, . . . [t]o prevent switches from distributing messages based upon incorrect information, switches quickly age-out and discard the ‘old’ information in their filtering databases.”). Further, when a failure at the current root port of switch 114 occurs, switch 114 “immediately” transitions to a new port and informs other devices of the change by transmitting dummy messages “through the new port,” which in turn causes the receiving switches to update their databases accordingly. *See* Pet. 58, 85, 92–93; Reply 26–28; Ex. 1005, col. 5, ll. 54–56, col. 6, ll. 42–46, col. 12, ll. 56–66, col. 13, ll. 34–49. Logically, the database of switch 114 would be updated for the new port “before” receiving communication traffic from access switches on that new

port because updating the database allows the switch to send the dummy messages that inform the access switches (allowing them to communicate with switch 114 that uses the new port). *See* Pet. 58; Reply 27–28; Ex. 1005, col. 12, ll. 59–62 (“[T]he identity of the new root port . . . must be propagated to the other devices . . . to prevent messages from being lost or misdirected.”). Dr. Olivier also agreed that a switch sending dummy messages from a new port would “need[] to update the information” it stores to reflect the newly assigned port. Ex. 1018, 107:19–108:5.

Patent Owner in its Response does not argue separately claims 5 and 17 and thus has waived, or forfeited, any argument for those claims. *See* PO Resp. 38; Paper 8, 7 (“Patent Owner is cautioned that any arguments not raised in the response may be deemed forfeited.”). In its Sur-Reply, however, Patent Owner asserts that Petitioner fails to show that Gai teaches “the switch implementing the method for rapid recovery updat[ing] its filtering database before receiving communication traffic from access switches” and that Petitioner makes improper new arguments in its Reply. Sur-Reply 11–12. Regardless of any waiver, we disagree with Patent Owner. Our findings above are based on disclosures in Gai discussed in the Petition. *See* Pet. 58, 85, 92–93. Patent Owner in its Sur-Reply also discusses switch 124, but that argument is only applicable to Petitioner’s “1A” theory, not to “1B.” *See* Sur-Reply 12.

Based on the full trial record, Petitioner has proven, by a preponderance of the evidence, that claims 5 and 17 would have been obvious based on Gai under 35 U.S.C. § 103(a), for the reasons stated by Petitioner in its “1B” analysis. *See* Pet. 55–58, 91–94; Reply 25–28; Ex. 1003 ¶¶ 133–139, 210–211.

e) Dependent Claims 6 and 18

Claim 6 depends from claim 1 and recites that “sending the dummy traffic comprises sending data frames originating at the edge switch while having source addresses corresponding to network addresses of other entities in the network that are accessible to the access switches via the edge switch.” Similarly, claim 18, which depends from claim 13, recites that “the dummy traffic comprises data frames originating at the edge switch while having source addresses corresponding to network addresses of other entities in the network that are accessible to the access switches via the edge switch.” For these limitations, Petitioner relies on Gai’s disclosure about switches updating their filtering databases after receiving the dummy messages, where dummy messages “carry the source address of each entity that is directly coupled to the device with the new active port or downstream thereof (relative to the root).” Pet. 59–60, 94 (quoting Ex. 1005, col. 5, ll. 54–60) (citing Ex. 1005, col. 11, l. 16, col. 13, ll. 14–33, col. 13, l. 50–col. 14, l. 3; Ex. 1003 ¶¶ 141–142, 212–213).

Patent Owner argues that “Petitioner cites to portions of Gai that disclose transmitting traffic originating from access switch 114 rather than an edge switch.” PO Resp. 39–40 (citing Ex. 2001 ¶¶ 101–102); Sur-Reply 11 (arguing that “switch 114 is an access switch and not an edge switch”). We disagree. In Petitioner’s modified Figure 1, switch 114 is both an “edge switch” (because it is a core switch directly connected to an access switch, i.e., switch 117) and an “access switch” (because it connects to server 112a). See Pet. 70–71; *supra* Section II.B; Ex. 1003 ¶¶ 166, 171. Dr. Olivier agrees that switch 114 in the modified arrangement would be an “edge switch” and an “access switch.” Ex. 1018, 86:14–87:12. And, for the reasons explained above, we determine that Petitioner’s modification to Figure 1—i.e., merely

adding switch 117 and server 112e—is supported sufficiently by the written description of Gai. *See supra* Section II.D.2.a.

Gai discloses that

[u]pon transition to the new forwarding port, the device begins transmitting ‘dummy’ multicast messages through the new port. These dummy multicast messages carry the source address of *each entity that is directly coupled to the device with the new active port or downstream thereof (relative to the root) and are received by other devices in the computer network*. Upon receipt, the other devices examine the contents of these messages and note the port on which they were received, which may differ from the port on which messages from these entities were previously received (i.e., before the failure and subsequent replacement of the device’s active port). It is through this process that other devices within the network learn to utilize the new forwarding port, rather than the failed port, when directing messages to these entities.

Ex. 1005, col. 5, l. 54–col. 6, l. 1 (emphasis added). Gai also discloses that rapid reconfiguration entity 234 “loads SA field 412 with the address of an entity directly coupled to switch 114. For example, in a first multicast message 400, entity 234 loads the address of server 112a into the source address field 412.” *Id.* at col. 13, ll. 14–18. “Multicast message 400, having the address of server 112a loaded in SA field 412, is then forwarded through the new root port (i.e., port number four) of switch 114.” *Id.* at col. 13, ll. 20–23. “Rapid reconfiguration entity 234 similarly generates one or more separate multicast messages 400 for each remaining entity directly coupled to access switch 114 (i.e., entities or end stations on LANs 102–104).” *Id.* at col. 13, ll. 50–53; *see also id.* at col. 13, ll. 64–66 (disclosing, e.g., that “at least one multicast message 400 is generated and transmitted for each entity directly coupled to or downstream of access switch 114 (relative to the root)”). Thus, Gai’s dummy traffic comprises data frames originating at the

“edge switch” (i.e., switch 114) while having source addresses corresponding to network addresses of “other entities in the network” (e.g., server 112a, entities or end stations on LANs 102–104) that are accessible to the “access switch” (i.e., switch 120) via the “edge switch” (i.e., switch 114), as recited in claims 6 and 18. *See* Pet. 59–60, 94; Reply 24.

Based on the full trial record, Petitioner has proven, by a preponderance of the evidence, that claims 6 and 18 would have been obvious based on Gai under 35 U.S.C. § 103(a), for the reasons stated by Petitioner in its “1B” analysis. *See* Pet. 59–60, 94; Reply 24; Ex. 1003 ¶¶ 140–141, 212–213.

f) “Downstream” Claims 11, 12, 23, and 24

Four challenged claims differ from the others discussed above in that they require that the dummy traffic be sent “downstream.” Claim 11 depends from claim 1 and recites that “sending the dummy traffic comprises sending data frames *downstream* from the edge switch toward the access switches” (emphasis added). Claim 12 is independent and recites “sending dummy traffic from the first bridge over the second link *downstream* to the second bridge, so as to cause the second bridge to modify its database responsive to the second port being in the active state” (emphasis added). Claim 23 depends from claim 13 and recites that “the dummy traffic comprises data frames sent *downstream* from the edge switch toward the access switches” (emphasis added). Claim 24 is independent and recites a bridge device comprising “first and second *downstream* ports, adapted to be coupled via first and second redundant links to a further bridge device located *downstream* in the network relative to the spanning tree root,” and a protocol processor adapted to “send dummy traffic over the second link

downstream to the further bridge device, so as to cause the further bridge device to modify its database responsive to the second *downstream* port being in the active state” (emphasis added). We refer primarily herein to the language of claim 12 since Petitioner relies on its claim 12 arguments for the other claims, but our findings apply to all four claims. *See* Pet. 90–91, 95.

As discussed above, the parties agree that, in the context of the ’986 patent, the term “downstream” means away from the root switch and the term “upstream” means toward the root switch. *See supra* Section II.B.

Petitioner’s “1B” arguments are premised on the existence of two components added to Figure 1 of Gai: switch 117 and server 112e. Pet. 68–70. That modification is supported sufficiently by Gai’s written description, for the reasons explained above. *See supra* Section II.D.2.a. Importantly, however, Petitioner proposes a *second* modification for purposes of the “downstream” claims—designating switch 117 as the root switch for the network. *See* Pet. 73–75, 85–86, 90 (arguing what would have been obvious “if switch 117 was the root”). Unlike the first modification, that change is *not* expressly supported by the written description of Gai; instead, Gai describes either switch 120 or switch 121 as the root switch of the network shown in Figure 1. *See* Ex. 1005, col. 10, ll. 37–41, col. 11, ll. 60–64, col. 14, ll. 16–20, col. 15, ll. 27–29, 38–51, col. 16, ll. 42–45. Nor are we persuaded that a person of ordinary skill in the art would have been motivated to make Petitioner’s second modification.

Petitioner argues that if switch 117 is designated as the root switch (instead of switch 120 or switch 121), then (1) the “second bridge” (i.e., switch 120) would be “located downstream” of the “first bridge” (i.e., switch 114), as recited in limitation [12a], and (2) dummy traffic would be sent over the “second link” (i.e., either link 128 connecting port 2 of

switch 114 to switch 122, or link 128 connecting port 4 of switch 114 to switch 124) “downstream” to the “second bridge,” as recited in limitation [12e], because it would be traveling “away from” root switch 117.

Pet. 73–75, 85–86 (citing Ex. 1003 ¶¶ 173–174, 190). In other words, by changing Figure 1’s root from switch 120 or switch 121 to switch 117, Gai would no longer send dummy traffic “upstream” but instead would send it “downstream.”

Citing various portions of Gai as support, Petitioner asserts that “any switch can be the root switch, e.g., the switch with the lowest switch identifier.” Pet. 4–5, 73, 85 (citing Ex. 1005, col. 2, ll. 42–47, col. 3, ll. 17–39, col. 10, ll. 29–33). “Accordingly,” according to Petitioner, “it would have been obvious that first bridge 114 would send dummy traffic downstream through the new active ports . . . away from the root switch and towards second bridge 120, if switch 117 was the root, because, e.g., it was the switch with the lowest switch identifier.” *Id.* at 85; Reply 18 (arguing that “when using conventional STP, the algorithm ‘simply selects the switch having the lowest ID to become the root,’” and “Gai’s disclosure does not limit the selection of the root or use of specific commands to any particular switch or location” (quoting Ex. 1005, col. 10, ll. 29–34)).

Patent Owner responds that a person of ordinary skill in the art would not have been motivated to make an access switch like switch 117 the root switch because doing so “would actually create an inefficient and poorly-optimized network,” pointing to other portions of Gai’s disclosure. PO Resp. 28–31 (citing Ex. 1005, col. 3, ll. 17–19, 23–29, col. 6, ll. 12–30; Ex. 2001 ¶¶ 74, 76–78); Sur-Reply 9–10. According to Patent Owner, “forcing an access switch to be the root is so inefficient that Gai actually teaches using commands on each access switch to prevent *any* access switch

from becoming the root,” so Petitioner’s second modification “forcing access switch 117 to be the root . . . would never be implemented in a normal, efficient network.” PO Resp. 29–31.

We have reviewed all of the portions of Gai referenced by the parties and conclude that Petitioner has not shown sufficiently that a person of ordinary skill in the art would have been motivated to designate switch 117 as the root switch when implementing the network reconfiguration method of Gai. The only mention of an access switch connected to port 7 of switch 114 is at column 13, lines 59–63 of Gai. While that sentence establishes that such an access switch may exist in the network, it does not state or imply that it would be the root switch. Instead, when discussing the operation of the Figure 1 network, Gai only identifies switches 120 and 121 as the root switch. *See* Ex. 1005, col. 10, ll. 37–41, col. 11, ll. 60–64, col. 14, ll. 16–20, col. 15, ll. 27–29, 38–51, col. 16, ll. 42–45.

To be sure, Gai does disclose that “execution of the spanning tree algorithm causes the switches to elect a single switch, among all the switches within each network, to be the ‘root’ switch,” where “[e]ach switch has a unique numerical identifier (switch ID) and the root is the switch having the lowest switch ID numeric value,” such that an access switch can be the root switch if it has the lowest switch ID. *See* Ex. 1005, col. 2, ll. 42–47, col. 10, ll. 29–36. As Patent Owner and Dr. Olivier explain in detail, though, Gai expressly cautions against doing so. Gai discloses that

[d]epending on the configuration of a given network, the location of the root can significantly affect the distance that messages must travel. For example, many networks include a plurality of switches designated as access switches that provide connectivity to LANs, end stations, etc., and a plurality of backbone switches that, in turn, interconnect the various access switches. If the root is located at an access switch and the principal server utilized by

the end stations (i.e., clients) is coupled to a backbone switch, the average distance between end stations and the primary server may be quite high, resulting in inefficient network operation. In addition, the backbone switches may become partitioned as ports between them are blocked.

Id. at col. 3, ll. 17–29; *see also id.* at col. 10, ll. 26–29 (the “location of the root may affect the average distance (i.e., the average number of hops) a message travels and/or cause undesirable partitioning of backbone switches”). Thus, the location of the root is not an unimportant consideration—it affects the distance messages must travel and can cause backbone switches to be partitioned. *See id.* Gai, therefore, discloses that “[t]o reduce the average distance and avoid partitioning of the backbone switches, *it is desirable to locate the root at a backbone switch.*”¹⁰ *Id.* at col. 3, ll. 29–31 (emphasis added). Switch 117 in Petitioner’s modified Figure 1 is an access switch, not a backbone switch. *See id.* at col. 6, ll. 10–12 (“Access switches are preferably coupled to entities (e.g., LANs, end stations, etc.) whereas backbone switches provide the interconnections between access switches.”).

Gai further discloses using a command at each access switch to prevent *any* access switch in the network from becoming the root. Gai describes three “novel commands” used to configure the network. Ex. 1005, col. 6, ll. 6–53. The first command, Become_Root_Primary, entered at a first backbone switch, “significantly lowers the value of the first backbone

¹⁰ Gai describes a mechanism by which a particular switch can be designated as the root: “[s]witch IDs . . . include a fixed portion and a settable portion,” so “[b]y substantially decreasing the value of the settable portion of the identifier for a selected switch, a network administrator may ‘force’ the network to choose the selected switch as the root.” Ex. 1005, col. 3, ll. 31–36.

switch's numeric ID, thereby forcing it to become the root upon execution of the spanning tree algorithm.” *Id.* at col. 6, ll. 12–17. The second command, `Become_Root_Secondary`, entered at a second backbone switch, “adjusts the second backbone switch’s ID to a value between a default value and the value specified in the `Become_Root_Primary` command, . . . caus[ing] the second backbone switch to become the new root upon a failure of the first backbone switch.” *Id.* at col. 6, ll. 19–26. And the third command, `Enable_Uplinkfast`, entered at every access switch, “substantially increases the values of access switches’ IDs, *effectively precluding any access switch from becoming the root.*” *Id.* at col. 6, ll. 27–30 (emphasis added), col. 9, ll. 49–58.

Petitioner in its Reply argues that Dr. Olivier conceded that an access switch “could” be selected as the root, based on the following exchange:

Q. So let’s take the example where the new forwarding port is port number 4. You would agree 3 that switch 114 would then send dummy messages out of port number 4 towards switch 124, right?

A. Correct.

Q. And sending some traffic from switch 114 to switch 124 would be sending dummy traffic away from switch 117, right?

A. Yes. It is sending traffic away from switch 117.

Q. And so if switch 117 was considered the root, the dummy traffic sent from switch 114 to switch 124 would be sent downstream or away from the root, right?

A. I disagree with [Patent Owner’s] hypothetical that 117 could be the root based on the teachings of Gai.

...

Q. Outside the teachings of Gai an access switch can be selected as the root, correct?

[COUNSEL]: Object to form, scope.

- A. Hypothetically depending on the network a switch connected directly to a user could be the root, especially in very simple networks. I'm thinking like the ones we teach in class where every switch is connected to a user in addition to other switches and we have redundant switches. So in that situation we'd select one root switch out of all what you would call access switches.

Ex. 1018, 97:1–98:11; *see* Reply 18.

The relevant question, however, is not what could be the root in Gai's method, but what a person of ordinary skill in the art would have been motivated to do based on the reference. *See Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1068–1069 (Fed. Cir. 2018) (finding that “the Board focused on what a skilled artisan would have been *able* to do, rather than what a skilled artisan would have been *motivated* to do at the time of the invention”); *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) (“[O]bviousness concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of prior art to arrive at the claimed invention.”). Petitioner and Dr. Houh do not provide any reason why a person of ordinary skill in the art *would* have deviated from the disclosures discussed above and changed Gai's disclosed method to implement switch 117 (rather than switch 120 or switch 121) as the root. *See* Pet. 73, 85; Ex. 1003 ¶¶ 173–174, 190. By contrast, Dr. Olivier provides a persuasive explanation, supported by express disclosures in Gai, why a person of ordinary skill in the art would not have been motivated to do so.¹¹ *See* Ex. 2001 ¶¶ 71, 72, 74–78. Based on the full trial record, we credit that explanation.

¹¹ Petitioner does not offer any additional declarant testimony with its Reply responding to Dr. Olivier's testimony.

Finally, we note that our determination herein regarding the “downstream” claims is consistent with what the ’986 patent states is the essential difference between it and Gai—namely, that Gai transmits dummy messages upstream toward the root switch, rather than downstream away from the root switch. *See* Ex. 1001, col. 3, ll. 29–33 (“[Gai’s] switch . . . transmits dummy multicast messages toward the root (upstream) through the newly-active trunk port”), col. 4, ll. 36–43 (“The [’986 patent’s disclosed] bridge is modified . . . so as to manage its redundant downstream ports in a novel way. This modification is *in contrast to* the methods described in [Gai] and the 802.1w draft, which require network entities to be aware of and manage redundancies in their upstream ports, and use special commands to cause them to do so.” (emphasis added)); Pet. 19; PO Resp. 13–14, 17. We conclude that Petitioner has not met its burden regarding challenged claims 11, 12, 23, and 24, which, in contrast with the other challenged claims, expressly recite “downstream” transmission.

Based on the full trial record, Petitioner has not proven, by a preponderance of the evidence, that claims 11, 12, 23, and 24 would have been obvious over Gai under 35 U.S.C. § 103(a) based on Petitioner’s “1B” theory.

3. *Petitioner’s “1A” Arguments*

a) *Claim 1*

We now turn Petitioner’s “1A” arguments, focusing primarily on limitation [1e].

Petitioner provides the following color version of Figure 1 of Gai to illustrate its position for “1A” (Pet. 29).

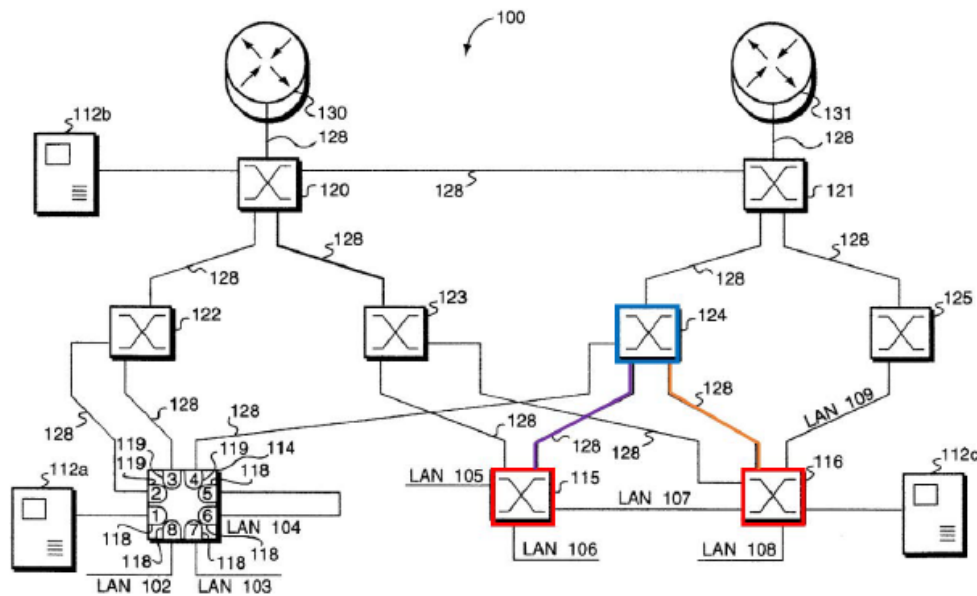


FIG. 1

The color version of Figure 1 above shows the alleged “edge switch” (switch 124 in blue), “one or more access switches” (switches 115 and 116 in red), “first redundant link” (in purple, between switches 115 and 124), and “second redundant link” (in orange, between switches 116 and 124) for Petitioner’s “1A” theory. *Id.* Petitioner argues that in response to a failure on the “first link” (in purple), a first port of switch 124 connected to the “first link” would switch to a “blocking state” and a second port of switch 124 connected to the “second link” (in orange) would be placed in an “active state.” *Id.* at 36–38.

Limitation [1e] recites “sending dummy traffic from the edge switch over the second link to the one or more access switches, so as to cause each of the one or more access switches to modify its respective database responsive to the second port being in the active state.” Petitioner argues that Gai teaches sending dummy traffic from the “edge switch” (i.e., switch

124) to the “one or more access switches” (i.e., switches 115 and 116) to cause the access switches to modify their respective databases (i.e., switches 115 and 116 updating their filtering databases). Pet. 39–46 (citing Ex. 1003 ¶¶ 100–112).

Petitioner acknowledges that in Gai’s description of Figure 1, a failure instead occurs on root port 3 of *switch 114*, causing another port like port 2 or port 4 to transition to the forwarding state and dummy messages to be transmitted upstream to root switch 121. Pet. 39–41. Petitioner argues, though, that “a [person of ordinary skill in the art] would have understood that a failure can happen at any port or link,” citing five other references as support for that proposition. *Id.* at 41 (citing Exs. 1006, 1011–1014). Petitioner’s analysis then is premised on how Petitioner contends Gai’s method hypothetically would work if a failure occurred on a *downstream port* of *switch 124*. *Id.* at 39–44. Petitioner provides the following color version of Figure 1 of Gai to illustrate its position (*id.* at 42).

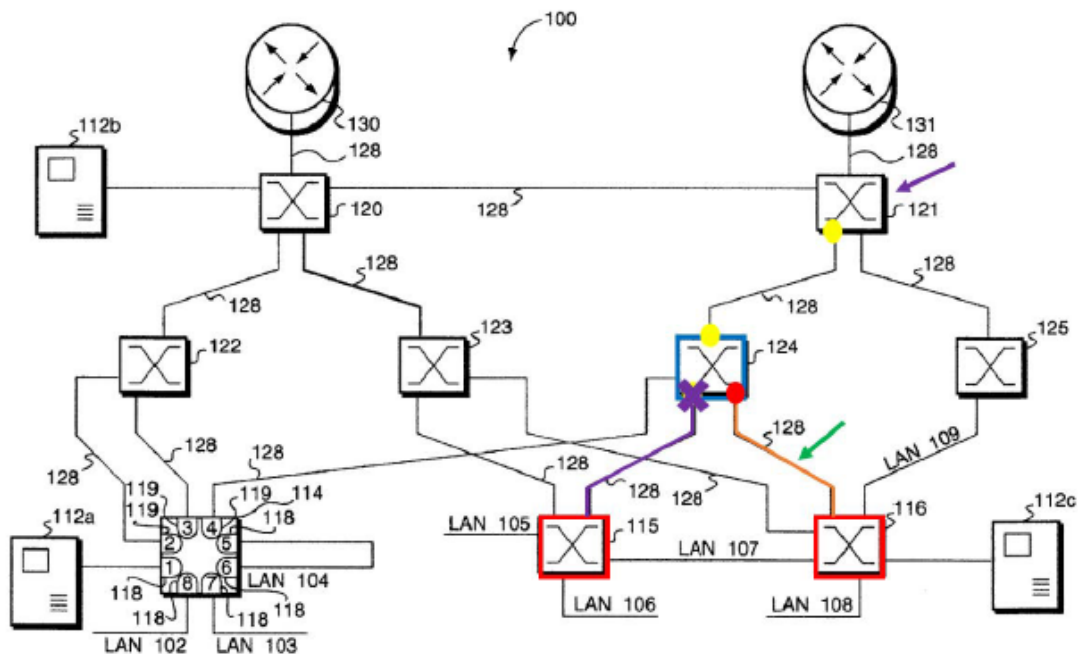


FIG. 1

The color version of Figure 1 above depicts Figure 1 with a purple X at switch 124 connected via link 128 to switch 115, a red dot at switch 124 connected via link 128 to switch 116, and a purple arrow pointing to switch 121 as the alleged root switch. *Id.* Petitioner argues that

if a failure happened at the port of switch 124 that is connected to first redundant link 128 [in purple], then a back-up port (indicated with a red dot) would transition from “blocked” to “forwarding” state, therefore coupling switch 124 to access switch 116 through second redundant link 128 [in orange with a green arrow]. . . .

Accordingly, upon transition to the new forwarding port, edge switch 124 would start transmitting dummy messages, e.g., a dummy message to access switches 116 and 115 (in that order) through the new forwarding port (indicated by the red dot) over link 128 [in orange].

Id. at 41–42.

The problem with Petitioner’s position, however, is that it is based on speculation as to what allegedly would happen in Gai “if” a failure occurred on a downstream port of switch 124. *See* Pet. 39–44. As Patent Owner correctly points out, “Gai does not describe backbone switch 124 in such a way.” *See* PO Resp. 20 (asserting that Petitioner’s “1A” theory is based on a “network configuration that is not actually disclosed by Gai”); Sur-Reply 2–5. Gai *never describes* the scenario Petitioner proposes, i.e., “blocking an active port of backbone switch 124, failing the link between access switch 115 and backbone switch 124, transitioning another port of switch 124 to a forwarding state, and marking link 128 between access switch 116 and backbone switch 124 as viable.” *See* PO Resp. 20.¹²

¹² Patent Owner also argues that a different declarant testified that “Gai does not disclose downstream transmissions” in IPR2024-00893, citing an exhibit

Gai discloses that each switch on the network selects as the “root port” the port that “gives the lowest cost path (e.g., the fewest number of hops, assuming all links have the same cost) from the switch to the root.” Ex. 1005, col. 2, ll. 53–56.

[F]or each access switch 114–116, only one port (local or trunk) that represents a path from the access switch to the root (i.e., provides connectivity to the root through links, shared media, switches, etc.) will be forwarding. All other ports (local or trunk) that represent paths from the access switch to the root will be blocked. In other words, only one port at each access switch 114–116 that provides connectivity to the root will be forwarding.

Id. at col. 11, ll. 8–15, code (57). “Should a change occur in the network 100, such as a failure disabling the link coupled to a root port of an access switch, the affected access switch” reconfigures the network. *Id.* at col. 11, ll. 36–41. Gai describes port 3 as the root port of switch 114 in the “forwarding state” and ports 2 and 4 in the “blocked state.” *Id.* at col. 11, ll. 41–48. If the link coupled to port 3 fails, either port 2 or port 4 “will immediately transition to the forwarding state and begin receiving and sending messages.” *Id.* at col. 11, ll. 48–52. Then, “the identity of the new root port (e.g., port number four) must be propagated to the other devices” in the network, so switch 114 “informs the other devices of its new forwarding port by transmitting dummy multicast packets through the new port” upstream toward the root switch. *Id.* at col. 12, ll. 59–66; *see also id.* at col. 6, ll. 39–46 (describing “failure of the current root port,” transition to one of the “back-up root ports,” and transmitting dummy messages through the “new port”), col. 12, l. 13–col. 13, l. 23 (describing “failure at . . . the

and the petition in that proceeding. Sur-Reply 4 n.1. Neither of those documents are part of the trial record in this proceeding, however.

root port,” “select[ing] a backup port to become the new root port,” transitioning to the new port, and transmitting dummy messages “through the new port”).

Patent Owner argues based on these disclosures, and we agree, that Gai is “directed to failures on a root port and the mechanisms by which such a failure is corrected and communicated to the root switch.” *See* PO Resp. 20; Sur-Reply 4–5. Indeed, Petitioner acknowledges that Gai’s *only* disclosed embodiment involves a failure occurring at a root port of an access switch. *See* Pet. 17, 24; Tr. 19:9–14. On the complete record, we find that Gai does not teach or suggest any failure on a link connected to a downstream, non-root port of a switch, nor does it describe how traffic would be managed in case of such a failure. *See* PO Resp. 12, 20–22, 33–34; Sur-Reply 2–8 (arguing that “Petitioner fails to identify any disclosure in Gai that discusses failures at non-root ports” and makes only “conclusory statements regarding how a [person of ordinary skill in the art] would understand and interpret Gai”).

Petitioner fails to identify sufficient support, in Gai or otherwise, to show that a person of ordinary skill in the art would have understood Gai to teach or suggest the operation described above in Petitioner’s color version of Figure 1. Petitioner asserts that a failure “can” occur at “any” port or link of a network. *See* Pet. 16–17, 24, 41; Reply 6. Certainly that is the case, as Patent Owner agrees. *See* Tr. 37:18–20 (Patent Owner stating that it is not “disputed that a downstream port could fail,” but arguing that “the issue is that Gai does not disclose how the system of Gai would handle any sort of downstream failure”); Ex. 1018, 61:14–62:8 (Dr. Olivier acknowledging that a failure “could” occur at any of switches 114–116 or 120–125 in Gai, and in response the switch would “send the dummy multicast messages upstream”).

But that fact alone is not sufficient to show that Gai teaches or suggests the specific operation that Petitioner describes for “1A,” i.e., a failure on a downstream, non-root port of switch 124 causing a transition to another downstream, non-root port and dummy traffic to be sent downstream. Given Gai’s singular disclosure of a failure on a root port and sending dummy traffic upstream from a newly-designated root port, we are not persuaded that the mere fact that other functionality is possible provides adequate support for Petitioner’s “1A” theory.¹³

Petitioner and Dr. Houh also point to two statements in Gai for support. *See* Pet. 16–17, 32; Reply 15; Ex. 1003 ¶ 89; Tr. 18:1–19:8, 45:16–47:9. First, Gai discloses the following:

The network preferably includes *a plurality of devices* executing the spanning tree algorithm so as to elect a root and place the ports of the devices in either a forwarding or blocked state. In accordance with the method, *one or more devices* are configured and arranged so that one trunk port is in the forwarding state and other trunk ports are in the blocked state. Additionally, one or more of the blocked ports are designated as back-up ports. *Upon detection of a failure at the active forwarding port*, the state of one of the back-up ports immediately transitions from blocked to forwarding, thereby becoming the new active port for the device. Ex. 1005, col. 5, ll. 36–47 (emphasis added). Second, Gai discloses the following:

In the illustrated embodiment, the method and apparatus manifests, in part, as a series of novel commands that may be entered at the devices. *The devices, moreover, may be classified as either access switches or backbone switches.* Access switches

¹³ *See Belden*, 805 F.3d at 1073 (“[O]bviousness concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of prior art to arrive at the claimed invention.”); *accord InTouch Techs., Inc. v. VGO Commc’ns, Inc.*, 751 F.3d 1327, 1352 (Fed. Cir. 2014).

are preferably coupled to entities (e.g., LANs, end stations, etc.) whereas backbone switches provide the interconnections between access switches.

Id. at col. 6, ll. 6–12 (emphasis added). We are not persuaded that these statements provide sufficient support for Petitioner’s position either. They merely indicate that Gai’s disclosed method involves multiple different devices, including access switches and backbone switches. They do not describe or suggest the scenario that Petitioner proposes, i.e., a failure on a downstream, non-root port of switch 124 causing a transition to another downstream, non-root port and dummy traffic to be sent downstream.

Further, after reviewing the testimony of both experts, we credit Dr. Olivier’s explanation as to why Gai does not provide support for Petitioner’s “1A” theory and does not teach or suggest the operation described in Petitioner’s color version of Figure 1 above. *See* Ex. 2001 ¶¶ 40–43, 55–70. Dr. Olivier explains in detail, with supporting citations to Gai, how the reference describes a switch identifying as the root port the port with the “lowest cost path to the root” and why, based on the path costs for backbone switches and access switches, the root port for switch 124 would be the port on the link connecting switch 124 and root switch 121, and the root ports on each of switches 115 and 116 would be the respective port on the link to switch 124. *Id.* ¶¶ 64–68.

Dr. Olivier provides the following additional color version of Figure 1 (Ex. 2001 ¶ 68).

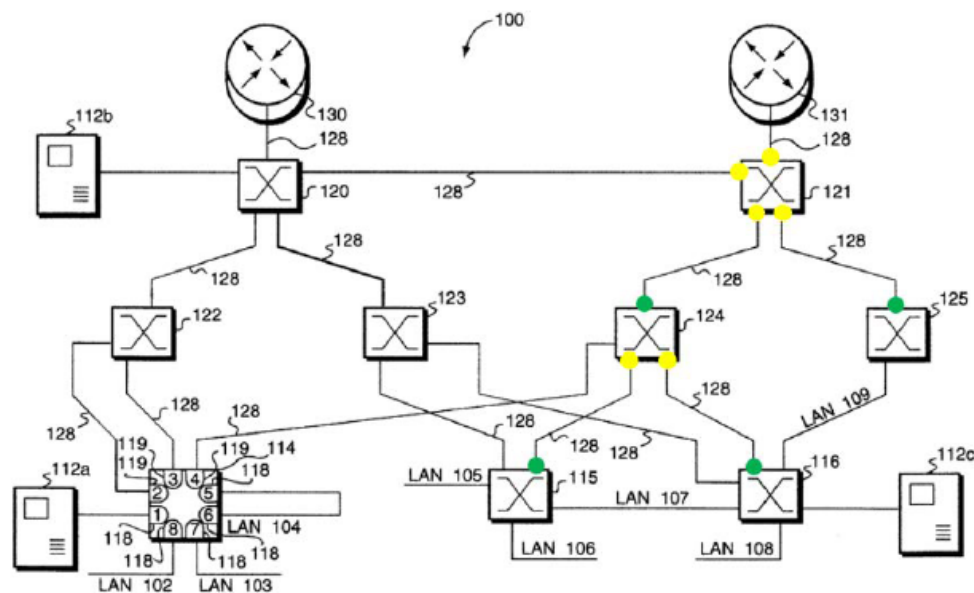


FIG. 1

The color version of Figure 1 above depicts the root ports for switches 115, 116, 124, and 125 in green and the other ports in yellow. *Id.* ¶ 68.

Dr. Olivier explains, with reference to the color version of Figure 1, that, based on Gai’s disclosure of failures at root ports, “if the link between switch 124 and switch 116 needed to be blocked for some reason, it is *the [green] port on switch 116 that would be blocked*, not the [yellow] port on switch 124” as Petitioner contends. *Id.* ¶ 69. Dr. Olivier’s explanation is consistent with the full disclosure of Gai and is persuasive.

We note two final points. First, Petitioner argues in its Reply that “a [person of ordinary skill in the art] would have been motivated to modify Gai to send dummy traffic downstream and/or to an access switch” because a person of ordinary skill in the art “would have been motivated to modify Gai’s transmission of dummy traffic to update network devices of the newly-active port to *all* network devices regardless of whether they are

upstream or downstream.” Reply 11–12. Petitioner does not point to anywhere in the Petition where it made that argument, however. Petitioner cites as support portions of a reference (Ex. 1012, “Burns”) that were not discussed in the Petition. *See id.* at 12 (citing Ex. 1012, col. 2, l. 64–col. 3, l. 7, col. 12, ll. 40–65); Pet. 24, 41 (citing a different portion of Burns for a different proposition). To the extent Petitioner is asserting a new modification to Gai’s described operation based on Burns, we do not consider Petitioner’s new argument. *See* 37 C.F.R. § 42.23(b); Patent Trial and Appeal Board Consolidated Trial Practice Guide (Nov. 2019), 73–74, *available at* <https://www.uspto.gov/TrialPracticeGuideConsolidated> (“‘Respond,’ in the context of 37 C.F.R. § 42.23(b), does not mean proceed in a new direction with a new approach as compared to the positions taken in a prior filing.”); *Intelligent Bio-Sys.*, 821 F.3d at 1369–70 (concluding that the Board did not err in refusing to consider reply arguments advocating a “new theory” of unpatentability under 37 C.F.R. § 42.23(b)). Petitioner also again asserts that a failure “can” occur on “any” link or port of a network and network traffic “could” be sent either upstream or downstream. *See* Reply 11–12 (citing Ex. 1018, 37:11–22, 61:14–62:1, 67:9–14). These mere possibilities are insufficient to support Petitioner’s position under the circumstances, for all of the reasons explained above.

Second, Petitioner cites as support claim 1 of U.S. Patent No. 7,848,264 B1 (Ex. 1006, “the Gai continuation”), a continuation of Gai, which recites “transmitting, by the back-up designated port, one or more messages, the messages to tell devices *downstream* in the spanning tree that the router has a new designated port.” Ex. 1006, col. 18, ll. 8–11 (emphasis added); *see* Pet. 43–44; Reply 7–8. Petitioner contends that the claim language in the Gai continuation, added by examiner’s amendment, shows

that Gai teaches “downstream” transmission. *See* Pet. 43–44 (citing Ex. 1010, 364–372). On the record presented, we do not see the relevance of the Gai continuation. Petitioner’s asserted ground under 35 U.S.C. § 103(a) is based on Gai alone, not the Gai continuation. Moreover, the Gai continuation was filed on April 25, 2005, more than five years after Gai issued on February 29, 2000. *See* Ex. 1005, code (45); Ex. 1006, code (22). Petitioner does not explain how the Gai continuation, filed years later, is relevant to the question before us of what a person of ordinary skill in the art would have understood Gai to teach or suggest at the time of the ’986 patent (January 2002). *See* Pet. 43–44; Reply 7–8. Nor does Petitioner point us to any authority for why that would be the case. *See id.*; Tr. 17:21–24, 44:20–45:14.

Based on the full trial record, Petitioner has not shown sufficiently, with respect to its “1A” theory, that Gai teaches or suggests “sending dummy traffic from the edge switch over the second link to the one or more access switches, so as to cause each of the one or more access switches to modify its respective database responsive to the second port being in the active state,” as recited in claim 1. Accordingly, Petitioner has not proven, by a preponderance of the evidence, that claim 1 would have been obvious based on Gai under 35 U.S.C. § 103(a) based on Petitioner’s “1A” theory.

b) Claims 2, 4–7, 9–14, 16–19, and 21–24

Petitioner’s arguments for the other challenged claims fail for the same reasons. Limitation [12e] of claim 12 recites “sending dummy traffic from the first bridge over the second link downstream to the second bridge, so as to cause the second bridge to modify its database responsive to the second port being in the active state.” Petitioner addresses limitations [1e]

and [12e] together. Pet. 39–46. Limitations [13e] and [13f] of claim 13 recite

the protocol processor being further adapted, responsive to a failure associated with the first link, . . . to send dummy traffic through the second access port over the second link to the one or more access switches, so as to cause each of the one or more access switches to modify its respective access switch database responsive to the second access port being in the active state.

And limitation [24e] of claim 24 similarly recites

the protocol processor being further adapted, responsive to a failure associated with the first link, . . . to send dummy traffic over the second link downstream to the further bridge device, so as to cause the further bridge device to modify its database responsive to the second downstream port being in the active state.

For those limitations, Petitioner refers in relevant part to its earlier arguments regarding limitation [1e]. *Id.* at 52, 54. We are not persuaded by Petitioner’s “1A” arguments regarding limitation [1e] for the reasons explained above. *See supra* Section II.D.3.a. Accordingly, based on the full trial record, Petitioner has not proven, by a preponderance of the evidence, that independent claims 12, 13, and 24, or claims 2, 4–7, 9–11, 14, 16–19, and 21–23, which depend from either claim 1 or claim 13, would have been obvious based on Gai under 35 U.S.C. § 103(a) based on Petitioner’s “1A” theory.

III. CONCLUSION¹⁴

As explained above, Petitioner has not proven, by a preponderance of the evidence, that claims 11, 12, 23, and 24 would have been obvious over Gai under 35 U.S.C. § 103(a) based on Petitioner’s “1B” theory.

Petitioner has proven, by a preponderance of the evidence, that claims 1, 2, 4–7, 9, 10, 13, 14, 16–19, 21, and 22 would have been obvious over Gai under 35 U.S.C. § 103(a) based on Petitioner’s “1B” theory.

Petitioner has not proven, by a preponderance of the evidence, that independent claims 1, 12, 13, and 24, or claims 2, 4–7, 9–11, 14, 16–19, and 21–23, which depend from either claim 1 or claim 13, would have been obvious over Gai under 35 U.S.C. § 103(a) based on Petitioner’s “1A” theory.

Accordingly, Petitioner has demonstrated, by a preponderance of the evidence, that claims 1, 2, 4–7, 9, 10, 13, 14, 16–19, 21, and 22 of the ’986 patent are unpatentable on the basis set forth in the following table, but has not demonstrated, by a preponderance of the evidence, that claims 11, 12, 23, and 24 of the ’986 patent are unpatentable.

¹⁴ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this Decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. §§ 42.8(a)(3), 42.8(b)(2).

In summary:

Claim(s)	35 U.S.C. §	Reference(s)/ Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1, 2, 4–7, 9–14, 16–19, 21–24	103(a)	Gai	1, 2, 4–7, 9, 10, 13, 14, 16–19, 21, 22	11, 12, 23, 24

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1, 2, 4–7, 9, 10, 13, 14, 16–19, 21, and 22 of the '986 patent are determined to be unpatentable;

FURTHER ORDERED that claims 11, 12, 23, and 24 of the '986 patent are not determined to be unpatentable; and

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

IPR2024-00505
Patent 6,917,986 B2

FOR PETITIONER:

Yung-Hoon Ha
DESMARAIS LLP
yha@desmaraisllp.com

FOR PATENT OWNER:

James R. Nuttall
Katherine D. Cappaert
STEPTOE LLP
jnuttall@steptoe.com
kcappaert@steptoe.com