

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS, INC.,
Petitioner,

v.

PORTSMOUTH NETWORK CORP.,
Patent Owner.

Case IPR2024-00506
Patent No. 8,014,394

PATENT OWNER'S NOTICE OF APPEAL

Pursuant to 37 C.F.R. § 90.2(a) and 35 U.S.C. §§ 141(c) and 142, Patent Owner Portsmouth Network Corp. (“Portsmouth”) hereby provides notice that it appeals to the United States Court of Appeals for the Federal Circuit from the Final Written Decision entered October 1, 2025 (Paper 38) (the “Final Written Decision”), and from all underlying orders, decisions, rulings and opinions, including without limitation the Decision of Institution of Inter Partes Review (Paper 8). A copy of the Final Written Decision is attached as Exhibit 1.

Pursuant to 37 C.F.R. § 90.3, this Notice of Appeal is timely, having been filed within 63 days after the Final Written Decision (Paper 38), which is dated October 1, 2025.

In accordance with 37 C.F.R. § 90.2(a)(3)(ii), Portsmouth indicates that the issues on appeal include, but are not limited to, the following:

1. Whether the Patent Trial and Appeal Board erred in its determination that Petitioner showed by a preponderance of the evidence that claims 1, 4, 6, 7, 11, 14, and 17 are unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of prior art references Weyman (U.S. Patent Application Publication No. 2005/0041665 A1) and Li (International Publication Number WO 2007/140702 A1);

2. Whether the Patent Trial and Appeal Board erred in its determination that Petitioner showed by a preponderance of the evidence that claims 5 and 15

are unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of prior art references Weyman (U.S. Patent Application Publication No. 2005/0041665 A1), Li (International Publication Number WO 2007/140702 A1), and Rooholamini (U.S. Patent Application Publication No. 2007/0297406 A1);

3. Whether the Patent Trial and Appeal Board erred in its determination that Petitioner showed by a preponderance of the evidence that claim 16 is unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of prior art references Weyman (U.S. Patent Application Publication No. 2005/0041665 A1), Li (International Publication Number WO 2007/140702 A1), and Pitcher (U.S. Patent No. 6,370,142 B1);

4. Whether the Patent Trial and Appeal Board erred in its determination that Petitioner showed by a preponderance of the evidence that claims 8 and 18 are unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of prior art references Weyman (U.S. Patent Application Publication No. 2005/0041665 A1), Jain (U.S. Patent Application Publication No. 2006/0224877 A1), and LeMaire (U.S. Patent No. 5,999,530);

5. Whether the Patent Trial and Appeal Board erred in its determination that Petitioner showed by a preponderance of the evidence that claim 9 is unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of prior art references Weyman (U.S. Patent Application Publication No. 2005/0041665

A1), Jain (U.S. Patent Application Publication No. 2006/0224877 A1), LeMaire (U.S. Patent No. 5,999,530), and Li (International Publication Number WO 2007/140702 A1);

6. Whether the Patent Trial and Appeal Board erred in its determination that Petitioner showed by a preponderance of the evidence that claim 10 is unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of prior art references Weyman (U.S. Patent Application Publication No. 2005/0041665 A1), Jain (U.S. Patent Application Publication No. 2006/0224877 A1), LeMaire (U.S. Patent No. 5,999,530), and Pitcher (U.S. Patent No. 6,370,142 B1);

7. Whether the Patent Trial and Appeal Board erred in its determination that Petitioner showed by a preponderance of the evidence that claims 2 and 12 are unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of prior art references Weyman (U.S. Patent Application Publication No. 2005/0041665 A1), Li (International Publication Number WO 2007/140702 A1), and Ding (U.S. Patent Application Publication No. 2006/0146823 A1);

8. Whether the Patent Trial and Appeal Board erred in its determination that Petitioner showed by a preponderance of the evidence that a person of ordinary skill in the art would combine the above-cited references;

9. Whether the Patent Trial and Appeal Board erred by failing to adequately address the arguments made by Patent Owner;

10. Whether the Patent Trial and Appeal Board erred by failing to adequately consider evidence presented by Patent Owner;

11. Whether the Patent Trial and Appeal Board erred in any findings or determinations supporting or related to the issues listed above, as well as all other issues decided adversely to Portsmouth in any orders, decisions, rulings, and opinions.

Simultaneous with this submission, (1) a copy of this Notice of Appeal is being filed with the Patent Trial and Appeal Board, (2) pursuant to Federal Circuit Rule 15, a copy of this Notice of Appeal, along with the required docketing fees paid via pay.gov, are being filed electronically with the Clerk's Office for the United States Court of Appeals for the Federal Circuit by CM/ECF, (3) a copy of this Notice of Appeal is being served on Petitioner, and (4) a copy of this Notice of Appeal is being filed with the Director of the United States Patent Office, as set forth in the accompanying Certificate of Service.

Patent Owner's Notice of Appeal

Respectfully submitted,

Date: December 3, 2025

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing PATENT OWNER'S NOTICE OF APPEAL was served on December 3, 2025 by filing this document through the P-TACTS platform as well as by delivering a copy via the delivery method indicated to the attorneys of record for the Petitioner as follows:

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IPR2024-00506
Patent Owner's Notice of Appeal

Additionally, pursuant to 37 C.F.R. § 90.2(a), the undersigned hereby certifies that, on December 3, 2025, in addition to being filed electronically through the Patent Trial and Appeal Board's P-TACTS system, a true and accurate copy of the foregoing PATENT OWNER'S NOTICE OF APPEAL is being filed with the Director of the United States Patent and Trademark Office by electronic mail to efileSO@USPTO.gov, which is the email address as indicated on the United States Patent and Trademark Office's webpage for the Office of the General Counsel, <https://www.uspto.gov/about-us/organizational-offices/office-general-counsel>.

I also hereby certify that, on December 3, 2025, a true and correct copy of the foregoing PATENT OWNER'S NOTICE OF APPEAL, a copy of the Final Written Decision, and the prescribed filing fee were filed electronically through CM/ECF with the Clerk's Office of the United States Court of Appeals for the Federal Circuit

Date: December 3, 2025

Respectfully submitted,
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EXHIBIT 1

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS, INC.,
Petitioner,

v.

PORTSMOUTH NETWORK CORP.,
Patent Owner.

IPR2024-00506
Patent 8,014,394 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 All 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, 4–12, and 14–18 of U.S. Patent No. 8,014,394 B2 (Ex. 1001, “the ’394 patent”) pursuant to 35 U.S.C.

§ 311(a). On October 3, 2024, the Board instituted an *inter partes* review as to all challenged claims on all grounds of unpatentability asserted in the Petition. Paper 8 (“Decision on Institution” or “Dec. on Inst.”). Patent Owner Portsmouth Network Corp. filed a Patent Owner Response (Paper 14, “PO Resp.”), Petitioner filed a Reply (Paper 24, “Reply”), and Patent Owner filed a Sur-Reply (Paper 28, “Sur-Reply”). An oral hearing was held on July 23, 2025, and a transcript of the hearing is included in the record (Paper 34, “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, 4–12, and 14–18 of the ’394 patent are unpatentable.

B. Related Matters

1. District Court Cases

The ’394 patent was the subject of *Portsmouth Network Corp. v. Cisco Systems, Inc.*, No. 23-cv-00441 (E.D. Tex.), which has been dismissed, and is the subject of *Portsmouth Network Corp. v. Juniper Networks, Inc.*, No. 23-cv-12201 (D. Mass), which has been stayed. See Pet. 2; Paper 30, 2.

2. Inter Partes Review Proceedings

Petitioner filed petitions challenging other patents asserted in the district court cases in IPR2024-00503 (instituted), IPR2024-00505 (instituted), IPR2024-00954 (denied), and IPR2024-01450 (instituted). A different petitioner filed petitions challenging claims 1, 2, 4, 6–12, 14,

and 16–18 of the ’394 patent in IPR2024-00913 (instituted) and IPR2024-00989 (instituted and consolidated with IPR2024-00913), and that petitioner also filed a petition challenging another patent asserted in the district court cases in IPR2024-00893 (instituted).

3. *Reexamination*

The ’394 patent was the subject of an *ex parte* reexamination, Control No. 90/019,441, in which the Office issued a reexamination certificate confirming claims 1–18 on July 14, 2025. Neither party listed the reexamination in their mandatory notice information filed in this proceeding.¹ See Papers 25, 30. In a General Order entered on September 19, 2025, the parties were ordered to

keep the Board apprised of developments regarding adjudication of validity or patentability of the challenged patent claims, or substantially similar patent claims, such as claim construction, findings of fact, or conclusions of law, in “any other judicial or administrative matter that would affect, or be affected by, a decision in the proceeding” and is identified as a related matter under 37 C.F.R. § 42.8(b)(2).

Paper 37, 1–2. The parties jointly responded that they were “unaware” of any such developments. Ex. 3001. In response to further inquiry from the Board, Petitioner stated its position that “no developments in [the reexamination]—including the issuance of the reexamination certificate—would affect, or be affected by, the decision in [this proceeding],” and Patent

¹ See 37 C.F.R. § 42.8 (2025) (requiring parties in an *inter partes* review to file mandatory notice information “[i]dentify[ing] any other judicial or administrative matter that would affect, or be affected by, a decision in the proceeding” and to update such information within 21 days of any change of such information).

Owner stated its position that “the issuance of the reexamination certificate establishes that the USPTO recently considered the patentability of [the ’394 patent] and found the challenged claims patentable and that this finding could be affected by a decision in [this proceeding].” *Id.* Neither party requested a conference call or sought to file any documents or submit any briefing pertaining to the reexamination. *See* Paper 37, 2 (ordering that, “after Board consultation, the parties shall file in the docket of this proceeding relevant materials from the related matter(s)”).

We have reviewed the record of the reexamination. The request for reexamination, filed on March 5, 2024, involved different prior art (references identified as Naik, Reader, Hu, Deng, Ramanathan, and Schuler) than what is asserted in this proceeding (Weyman, Li, Rooholamini, Pitcher, Jain, LeMaire, and Ding). Likewise, the sole Office Action rejecting claims 1–18, dated December 17, 2024, involved only the prior art submitted with the request for reexamination.

Patent Owner filed Information Disclosure Statements on June 18, 2024, and March 25, 2025, identifying over 180 documents. Certain papers and exhibits from this proceeding (including the asserted references), IPR2024-00913, and IPR2024-00989 were identified, but it does not appear that any of those materials, including the references we have considered in this proceeding, were cited or relied upon by the Examiner during the reexamination.

The Examiner ultimately determined, in a Notice of Intent to Issue Ex Parte Reexamination Certificate dated May 8, 2025, that

[t]he combination of limitations presented in the independent claims of the ’394 patent . . . describes and claims a router with a distributed architecture, which, among other things, requires its line card processing units: *(1) store a list indicating all multicast*

packet streams that are permitted for forwarding by the router; and (2) distribute any received client request to all other processing units in the router. The '394 patent claims require that the line card processing units perform both tasks which is performed using a processor on each line card that do the processing to handle incoming multicast packets using a distributed router architecture. The patentability of all reexamined claims are confirmed because of the distributed network of the '394 patent in contrast to the centralized system of Naik which additionally does not disclose “storing in each processing unit a respective list, each list indicating all of one or more multicast packet streams that are permitted for forwarding by the network element.” The examiner acknowledges the 3/17/2025 Oliver Declaration that discloses that Naik’s route processors cannot be used to satisfy the '394 patent limitations assigned to the line card processing unit. Accordingly the claims are confirmed based on the distributed processing network of the '394 patent and that the prior art references do not disclose “storing in each processing unit a respective list, each list indicating all of one or more multicast packet streams that are permitted for forwarding by the network element.”

The Examiner thus referenced two limitations of the '394 patent’s independent claims: (1) limitations pertaining to “storing” lists (identified as limitations [1e], [8e], [11f], and [18f] in this proceeding), and (2) limitations pertaining to “distributing” a request (identified as limitations [1g], [8g], [11h], and [18h] in this proceeding). As explained below, we find that those limitations are taught by Weyman. *See infra* Sections II.D.3.a, II.D.4, II.F.3.a, II.F.4; Pet. 33–41, 54–55, 76–77, 82. Patent Owner does not dispute that the limitations are taught by Weyman.

Given the above differences between this proceeding and the reexamination, we conclude that a different outcome is warranted. For the reasons set forth herein, Petitioner has met its burden to prove, by a

preponderance of the evidence, that claims 1, 2, 4–12, and 14–18 of the '394 patent are unpatentable.

C. The '394 Patent

The '394 patent, titled “High-Speed Processing of Multicast Content Requests,” issued September 6, 2011, from U.S. Patent Application No. 12/369,011, filed on February 11, 2009. Ex. 1001, codes (21), (22), (45), (54). The '394 patent relates to delivery of multicast traffic streams over a communication network through a “network element.” *Id.* at code (57). The goal of the '394 patent is to enable the fast delivery of multicast content with minimal latency for processing events associated with changing the multicast forwarding configuration. *Id.* at col. 4, ll. 58–62.

More specifically, the '394 patent describes:

Some multicast content applications are highly sensitive to the response time to changes in the forwarding configuration. For example, in an Internet Protocol Television (IPTV) application, when a user switches (“zaps”) from one television channel to another, the user’s set-top box initiates a process of stopping to receive one multicast packet stream and starting to receive another multicast stream. The zapping time, i.e., the time from the moment the user switches the channel in his or her set-top box until the new channel is displayed, is determined by the time needed by the network to apply this forwarding change. Fast zapping time is particularly difficult to achieve when the rate of change requests is high, such as during a commercial break in which a large number of users switch channels almost simultaneously.

Embodiments of the present invention provide improved methods and systems for performing selective multicast forwarding in packet networks. The disclosed methods and systems are particularly effective in adapting rapidly to requests to change the multicast forwarding configuration.

Ex. 1001, col. 4, ll. 44–62.

The network element described in the '394 patent to accomplish this is illustrated in Figure 1, which is reproduced below.

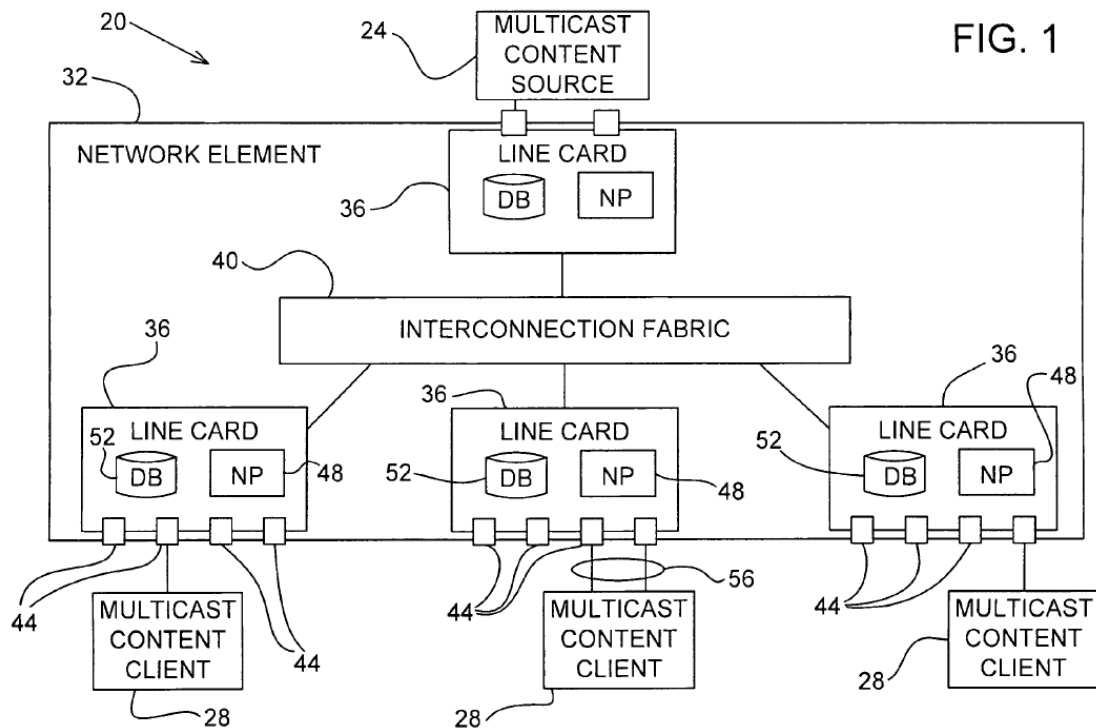


Figure 1 shows network element 32, which processes communication packets received on its ports 44 from packet network 20. Ex. 1001, col. 5, ll. 57–64. The network element has line cards 36, each of which has a network processor (NP) 48, a database 52, and ports 44. *Id.* at col. 6, ll. 23–46. “The line cards are interconnected by an interconnection switch fabric 40.” *Id.* at col. 6, ll. 24–25. Once packets are received on a port in a line card, the corresponding network processor 48 responsible for that port processes them. *Id.* at col. 6, ll. 32–35. “Each line card 36 further comprises a filtering database 52, which holds a list of multicast streams that are permitted for forwarding by the network element” *Id.* at col. 6, ll. 35–38.

Figure 1 also shows a multicast content source 24, such as live IP Television (IPTV), connected to the top line card through its left port. Ex. 1001, col. 5, l. 64–col. 6, l. 3. Three multicast content clients 28 are shown on the bottom of Figure 1, one connected to each of the bottom three line cards. *Id.* at col. 6, ll. 4–6. “In an IPTV application, the multicast clients may comprise set-top boxes.” *Id.* at col. 6, ll. 15–17. For some multicast streams, “two or more ports 44 are aggregated to form a high-capacity port 56, in order to provide high traffic capacity and redundancy to a certain content client or content source.” *Id.* at col. 6, ll. 61–64. A common communication protocol used to broadcast and receive multicast streams is Internet Group Management Protocol (IGMP). *Id.* at col. 1, ll. 21–24.

“In order to avoid unnecessary congestion and processing load, network element 32 forwards multicast streams from source 24 to clients 28 selectively, rather than flooding . . . all ports.” Ex. 1001, col. 7, ll. 10–13. “For this purpose, filtering database 52 in each line card 36 holds a list of multicast streams, which are permitted for forwarding by the network element.” *Id.* at col. 7, ll. 13–16. “[T]he filtering databases also indicate the specific port or ports to which each permitted multicast stream is to be forwarded.” *Id.* at col. 7, ll. 16–18. “When the network element receives a given multicast stream from source 24, NP 48 in a given line card 36 forwards this stream to the designated ports only if the stream appears in its filtering database.” *Id.* at col. 7, ll. 18–21.

“The filtering databases in the different line cards are updated by monitoring request messages, which are sent by the multicast clients in order to start or stop receiving certain multicast content.” Ex. 1001, col. 7,

ll. 23–26. Figure 2, which shows how the databases are updated when a request for new multicast content is received, is reproduced below.

FIG. 2

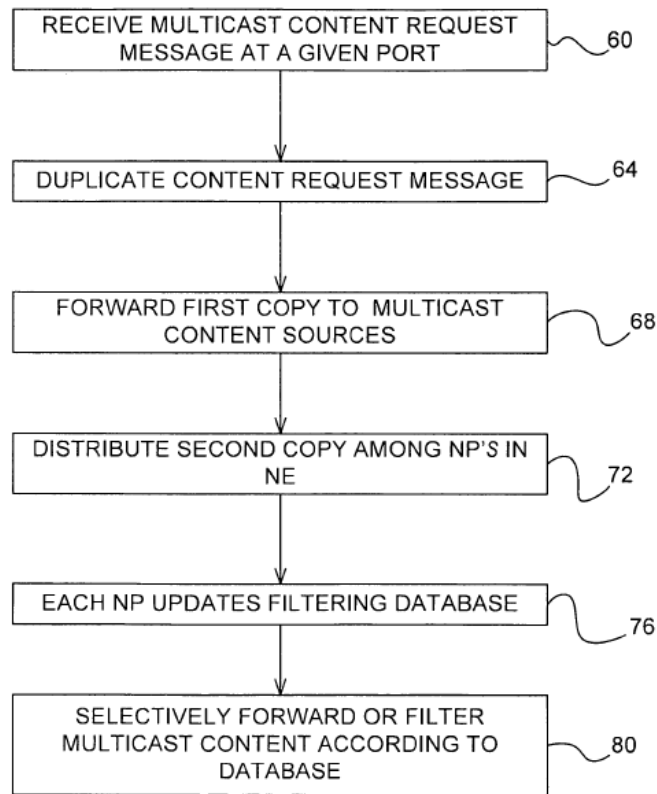


Figure 2 “is a flow chart that schematically illustrates a method for updating databases 52 based on multicast content requests.” *Id.* at col. 7, ll. 27–29. As shown on the top of the flowchart, “network element 32 receive[s] a multicast content request message, at a request reception step 60.” *Id.* at col. 7, ll. 30–32. “The request is sent from a given multicast client 28, is addressed to a certain multicast source and arrives at one or ports 44 of the network element.” *Id.* at col. 7, ll. 34–36. “The multicast content request may comprise, for example, a request to join a certain multicast service (i.e., to start receiving certain multicast content) or to leave a certain multicast

service (i.e., to stop receiving certain multicast content).” *Id.* at col. 7, ll. 40–43. “For example, in an IPTV application, when a multicast client 28 (e.g., a set-top box) switches (‘zaps’) from one television channel to another, the client sends a request to stop receiving the content of the previous channel and to start receiving the content of the new channel.” *Id.* at col. 7, ll. 46–50.

Next, step 64 in the flowchart shows that the “line card duplicates the request.” Ex. 1001, col. 7, ll. 53–54. In step 68, “[t]he first copy of the request is forwarded to the appropriate multicast sources.” *Id.* at col. 7, ll. 54–56. At step 72, a “second copy of the request is forwarded to all the NPs in the network element.” *Id.* at col. 7, ll. 56–58. At step 76, “[e]ach NP receiving the distributed copy updates its respective database 52.” *Id.* at col. 7, ll. 63–65. “[T]he distributed copy comprises an indication of the ingress port, i.e., the port via which the request arrived at the network element.” *Id.* at col. 8, ll. 3–5. “If the request comprises a request to receive a certain multicast stream, the NPs update their filtering databases to permit forwarding of the requested multicast stream. . . . to [the ingress] port [of the request].” *Id.* at col. 8, ll. 9–18. “If the request comprises a request to stop receiving a certain multicast stream, the NPs remove the corresponding entry from their filtering databases.” *Id.* at col. 8, ll. 22–24. Finally, at step 80, “[t]he network element selectively forwards incoming multicast streams in accordance with the updated filtering databases,” i.e., by sending them out of the ingress port where the request came from, which is now stored in the filtering databases. *Id.* at col. 8, ll. 25–27.

The ’394 patent also describes how limits can be placed on the number of streams allowed on a given port. Ex. 1001, col. 8, ll. 36–59. “In some embodiments, the network element allows only a limited number

of multicast streams to be forwarded over any given port, so as not to exceed the maximum bandwidths of the ports. For example, a maximum allowed number of multicast streams may be set to each port.” *Id.* at col. 8, ll. 36–40. “In these embodiments, filtering databases 52 hold port counters, which are indicative of the number of multicast streams that are permitted for forwarding over each port” *Id.* at col. 8, ll. 41–45.

Typically, the port counter of a given port is initialized to the maximum allowed number of [multicast streams]. The counter is decremented when a new multicast stream is permitted for forwarding to the port, and is incremented when an existing multicast stream is removed from the port. Thus, a port counter that is equal to zero indicates that the maximum allowed number of streams have already been permitted for this port.

Id. at col. 8, ll. 51–58.

D. Illustrative Claims

Challenged claims 1, 8, 11, and 18 of the ’394 patent are independent. Claims 2 and 4–7 depend from claim 1, claims 9 and 10 depend from claim 8, and claims 12 and 14–17 depend from claim 11. Claims 1, 5, and 8 recite (with letter designations used in the Petition to refer to the various limitations):

1. A method for communication, comprising:

[a] operating a network element, [b] wherein the network element further comprises multiple interconnected processing units and multiple ports, [c] wherein each processing unit is assigned to a different subset of the multiple ports of the network element, and [d] wherein each processing unit contains a processor for processing packets communicated over the different subset of the multiple ports to which the processing unit is assigned;

[e] storing in each processing unit a respective list, each list indicating all of one or more multicast packet streams that are

permitted for forwarding by the network element, and further indicating which of the one or more ports each multicast packet stream is permitted to be forwarded to;

[f] receiving from a client a request relating to reception of a given multicast packet stream;

[g] distributing the request among the multiple processing units within the network element, and [h] updating the respective list in each processing unit responsively to the request; and

[i] selectively forwarding multicast packets associated with the given multicast packet stream by the processing units in accordance with the respective updated lists,

[j] wherein operating the network element comprises aggregating two or more of the ports to form a high-capacity port, and

[k] wherein aggregating the ports comprises setting an upper limit on a number of the multicast packet streams that are permitted for forwarding over the high-capacity port, [l] wherein the request indicates that the given multicast packet stream is to be forwarded over the high-capacity port, and [m] wherein updating the list comprises modifying the list to indicate that the given multicast packet stream is permitted for forwarding over the high-capacity port only when the number of the multicast packet streams that are permitted for forwarding over the high-capacity port, including the given multicast packet stream, does not exceed the upper limit.

5. The method according to claim 1, [a] wherein the ports forming the high-capacity port are assigned to at least two of the processing units, and [b] wherein updating the list comprises holding respective local copies of the number of the multicast packet streams that are permitted for forwarding over the high-capacity port, updating the local copies based on the distributed request, and selectively updating the list in each of the at least two processing units based on the respective local copies.

8. A method for communication, comprising:

[a] operating a network element, [b] wherein the network element further comprises multiple interconnected processing

units and multiple ports, [c] wherein each processing unit is assigned to a different subset of the multiple ports of the network element, and [d] wherein each processing unit contains a processor for processing packets communicated over the different subset of the multiple ports to which the processing unit is assigned;

[e] storing in each processing unit a respective list, each list indicating all of one or more multicast packet streams that are permitted for forwarding by the network element, and further indicating which of the one or more ports each multicast packet stream is permitted to be forwarded to;

[f] receiving from a client a request relating to reception of a given multicast packet stream;

[g] distributing the request among the multiple processing units within the network element, and [h] updating the respective list in each processing unit responsively to the request; and

[i] selectively forwarding multicast packets associated with the given multicast packet stream by the processing units in accordance with the respective updated lists,

[j] wherein operating the network element comprises initializing a new processing unit added to the network element by:

[k] deactivating the ports to which the new processing unit is assigned;

[l] while the ports to which the new processing unit is assigned are deactivated, sending a multicast status request, receiving multicast membership reports sent by multicast clients in response to the multicast status request, constructing the list by the new processing unit based on the received multicast membership reports; and

[m] after constructing the list, activating the ports to which the new processing unit is assigned.

E. Evidence

The pending grounds of unpatentability in the instant *inter partes* review are based on the following prior art:

U.S. Patent No. 5,999,530, issued Dec. 7, 1999 (Ex. 1011, “LeMaire”);

U.S. Patent No. 6,370,142 B1, issued Apr. 9, 2002 (Ex. 1009, “Pitcher”);

U.S. Patent Application Publication No. 2005/0041665 A1, published Feb. 24, 2005 (Ex. 1005, “Weyman”);

U.S. Patent Application Publication No. 2006/0146823 A1, published July 6, 2006 (Ex. 1012, “Ding”);

U.S. Patent Application Publication No. 2006/0224877 A1, published Oct. 5, 2006 (Ex. 1010, “Jain”);

U.S. Patent Application Publication No. 2007/0297406 A1, published Dec. 27, 2007 (Ex. 1008, “Rooholamini”); and

WO Patent Application Publication No. 2007/140702 A1, published Dec. 13, 2007 (Exs. 1006 (original), 1007 (certified translation), 1032 (certified translation with page numbers), “Li”).²

Petitioner filed a declaration from Henry H. Houh, Ph.D. (Ex. 1002) 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. 1034) and Dr. Olivier (Ex. 1033).

² We refer to “Li” as the English translation (Exhibit 1032) of the original patent document in Chinese. Petitioner provided a declaration attesting to the accuracy of the translation and later filed a copy with page numbers to correct a “formatting error” in the originally filed translation. See Exs. 1007, 1032; Reply 3 n.1; 37 C.F.R. § 42.63(b).

F. Asserted Grounds

Petitioner asserts that claims 1, 2, 4–12, and 14–18 of the '394 patent would have been obvious on the basis of prior art printed publications under 35 U.S.C. § 103(a):³

Claim(s) Challenged	35 U.S.C. §	References/Basis
1, 4, 6, 7, 11, 14, 17	103(a)	Weyman, Li
5, 15	103(a)	Weyman, Li, Rooholamini
16	103(a)	Weyman, Li, Pitcher
8, 18	103(a)	Weyman, Jain, LeMaire
9	103(a)	Weyman, Jain, LeMaire, Li
10	103(a)	Weyman, Jain, LeMaire, Pitcher
2, 12	103(a)	Weyman, Li, Ding

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

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 '394 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). Also, we note that the Petition lists claim 16 as challenged based on the combination of Weyman and Li as well as the combination of Weyman, Li, and Pitcher, but includes no argument as to the former. *See* Pet. 6. We understand this to be a typographical error and that Petitioner only challenges claim 16 based on the combination of Weyman, Li, and Pitcher.

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 ’394 patent (February 2009), a person of ordinary skill in the art would have had “a bachelor’s degree in computer science, computer engineering, electrical engineering, or 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 education, and vice versa.” Pet. 12 (citing Ex. 1002 ¶¶ 62–63). In the Decision on Institution, the Board agreed with and applied Petitioner’s proposed definition. Dec. on Inst. 12–13. Patent Owner uses the same definition for its Response. PO Resp. 8; see Ex. 2001 ¶¶ 30–31. Based on the full record developed during trial, including our review of the ’394 patent and the types of problems and solutions described in the ’394 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. 12. Patent Owner states that its arguments “do not rely on any proposed construction,” but notes that Petitioner proposed constructions in the district court case for the terms “multicast packet stream” and “a new processing unit added to the network element.” PO Resp. 7–8. Specifically, Petitioner argued in the district court case that “multicast packet stream” means “the actual content coming from a multicast source, such as a channel or movie,”⁴ and “a new processing unit added to the network element” means “a processing unit newly-inserted into the network element.” *Id.* (quoting Ex. 2003, 26, 29). Patent Owner argues that, “[t]o the extent the Board finds that any of these constructions apply,” Petitioner has not proven unpatentability of the challenged claims. *Id.* at 8. As confirmed at the oral hearing, however, neither party proposes an interpretation of any claim term in this proceeding. *See id.* at 7; Reply 30; Tr. 20:3–16, 45:6–10. The Board did not interpret any terms in the Decision on Institution, and we conclude based on the full trial record that no term requires express interpretation to determine whether Petitioner has met its burden to prove unpatentability of the challenged claims. *See* Dec. on Inst. 13; *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)).

⁴ In the district court case, Patent Owner proposed that “multicast packet stream” be given its “[p]lain and ordinary meaning” or construed as “[a] packet stream that can be sent to multiple devices.” Ex. 2003, 29.

C. Legal Standards

To prevail in its challenge to the patentability of claims 1, 2, 4–12, and 14–18 of the '394 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.”⁵ *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).

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”).

“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,

⁵ Patent Owner does not present any evidence of objective indicia of nonobviousness in this proceeding.

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 Weyman and Li
(Claims 1, 4, 6, 7, 11, 14, and 17)

1. *Weyman*

Weyman is a published U.S. patent application titled “System and Method for Distributed Multicast Routing.” Ex. 1005, code (54). Similar to the ’394 patent, Weyman describes a “distributed router composed of individual units” that “appears to be a single network entity” for communicating multicast packets. *Id.* at code (57).

Figure 5 in Weyman illustrates a distributed router with multiple units and is reproduced below.

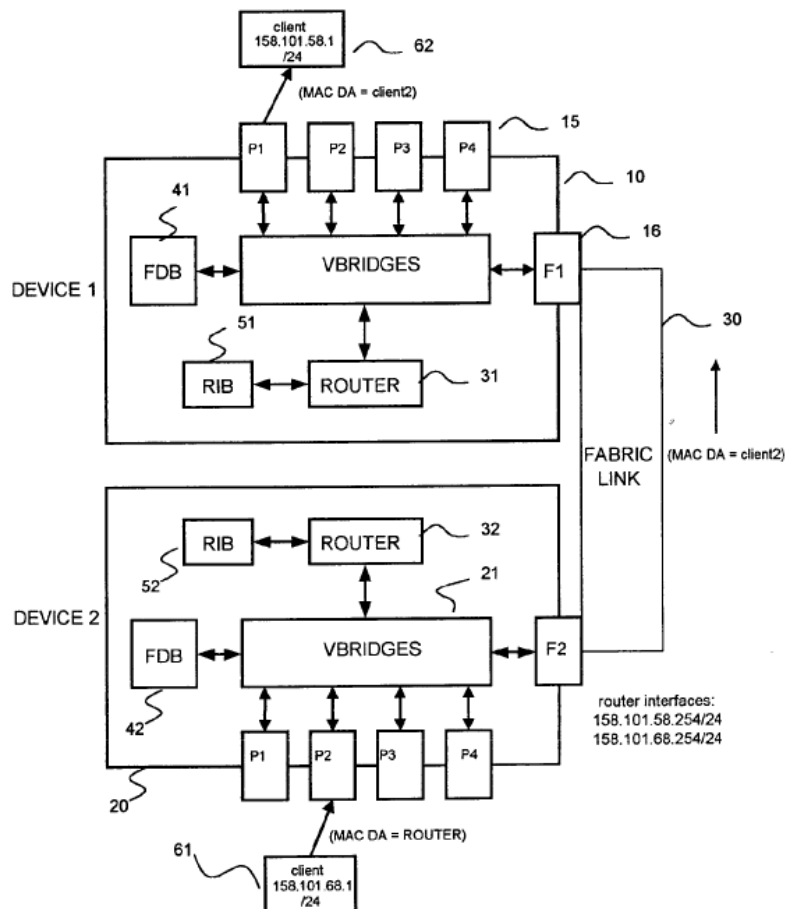


FIG.5

Figure 5 shows how two units, Device 1 (labeled 10) and Device 2 (labeled 20), are connected to each other by a Fabric Link 30 via ports F1 and F2 to form one distributed router. Ex. 1005 ¶ 64. Each unit (device) has four user ports P1–P4 (collectively labeled 15 on device 1) that can connect to other devices in the network such as routers and clients. *Id.* Each unit also has a bridge, labeled Vbridge 21 on device 2, and a forwarding database (FDB) used by the bridge, labeled 41 and 42 on devices 1 and 2, respectively. *Id.* Each bridge also has a router, labeled 31 and 32, and a routing information base (RIB), labeled 51 and 52. *Id.* All of the individual routers in a

distributed router have the same RIB that causes them to collectively operate as one distributed router. *Id.* ¶¶ 65–71.

Weyman discloses that “[t]o enable resilience throughout the network the network units connected to the distributed router should preferably be configured with redundant physical links to the network.” Ex. 1005 ¶ 86. Figure 6 of Weyman is reproduced below.

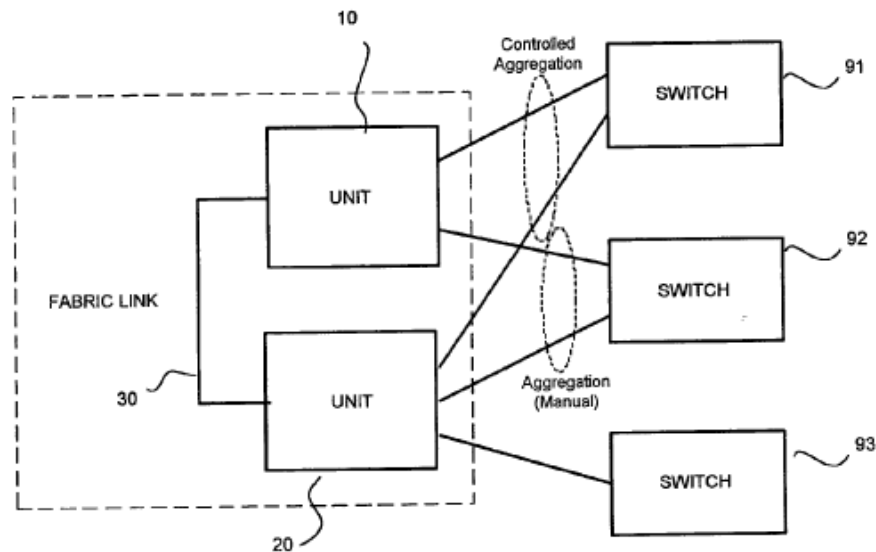


FIG.6

Figure 6 depicts units 10 and 20 connected by fabric link 30, external switch 91 with “link aggregation” connections to both units, switch 92 with manually created “link aggregation” connections to both units, and switch 93 with a connection only to unit 20. *Id.* ¶ 88. Weyman discloses that “[i]f the fabric link 30 between unit 10 and unit 20 fails, the link aggregation control protocol running on switch 91 would detect that it is now connected to two separate units and would convert the aggregation into two separate links,” which “would allow connectivity between units 10 and 20 and switch 91 to be maintained.” *Id.* ¶ 89.

Weyman's distributed router can handle multicast streams. Ex. 1005 ¶¶ 65–71. Figure 11 helps illustrate how this works and is reproduced below.

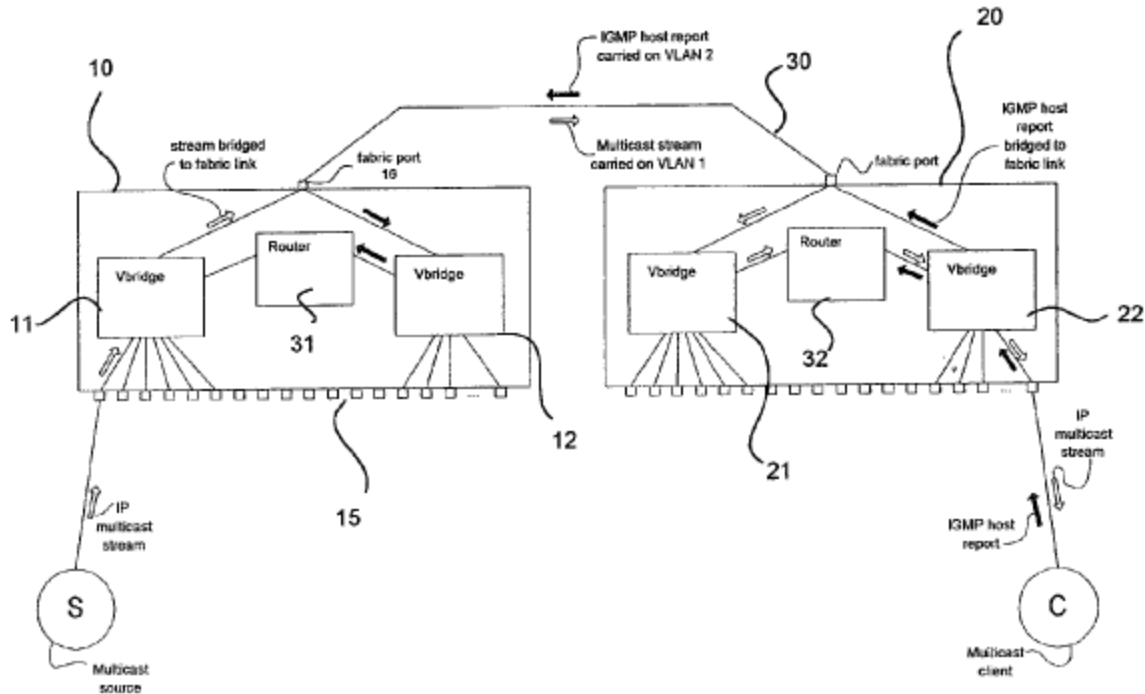


FIG.11

Figure 11 helps show how a multicast client, shown connected to the rightmost user port of unit 20, can request a multicast stream from the source connected to the leftmost port in unit 10. *Id.* ¶ 136. When client C wants to join the multicast stream, it sends a request, an IGMP host report, to unit 20. *Id.* ¶¶ 137, 162. Unit 20 sends the request to its internal router 32 and also to the fabric port for forwarding to router 31 in unit 10. *Id.* Then “the router[s] in both units would snoop the IGMP report and would use the report in the construction of the multicast forwarding tables.” *Id.* ¶ 139. In this way, all RIBs have the same entries. *Id.* ¶¶ 65, 162. The Vbridge forwarding databases, FDBs, are populated in a similar way from the addresses of the packets involved in the IGMP request message. *Id.* ¶¶ 45–46. Once the

forwarding information has been created, the Vbridges and routers will coordinate to deliver the multicast stream from the source to the client. *Id.* ¶¶ 103, 127.

Weyman also teaches that a unit's ports can be combined to form an "aggregated link" in order to provide "resilience in a distributed router." Ex. 1005 ¶¶ 50, 86. An aggregated link "comprises a multiplicity of physical connections [i.e., ports] constituting a single logical connection." *Id.* ¶¶ 50, 88–89.

2. *Li*

Li is a published international patent application titled "Multicast Service Processing Method, System, and Access Device." Ex. 1032, code (54). Similar to Weyman, *Li* discloses using communication devices to deliver multicast content from a source to a client. *Id.* at p. 1, l. 20–p. 2, l. 11. In *Li*, the client uses an "access device" to request access to multicast streams. *Id.* The access device functions as a multicast router. *Id.* at p. 26, ll. 13–17.

Figure 9 illustrates how this setup works and is reproduced below.

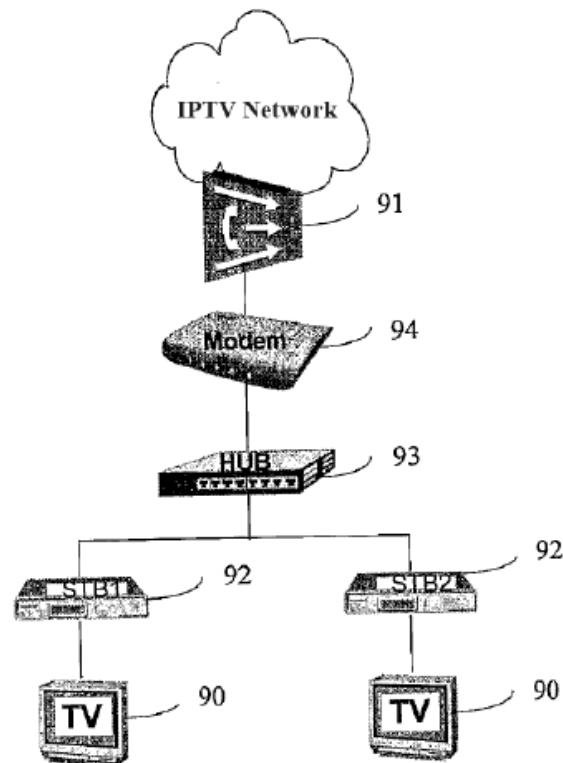


FIG. 9

Figure 9 shows multicast clients, set top boxes (STBs) 1 and 2, labeled 92, connected to a router 91 (the access device), which in turn is connected to an IPTV network. Ex. 1032, p. 26, ll. 13–17. When the STB sends a multicast join request to router 91, the router determines “whether a multicast channel request[] to join is permitted to join” the port. *Id.* at p. 27, ll. 10–13. In doing so, the router checks the maximum number of multicast channels allowable on its service ports:

[E]ach . . . service port is configured with the maximum number of accessed multicast channels allowable, which can be set dependent [on the] bandwidth of the . . . port or as required for management. . . . [If] the number of channels being forwarded over the port is below the maximum number of accessed channels allowable, which is set for the port, . . . the port allows

an access to the new channel for joining; otherwise, the new channel cannot be added.

Id. at p. 28, l. 23–p. 29, l. 1. If allowed, the router “start[s] forwarding data of the new channel; otherwise, it is preliminarily determined that the channel is rejected.” *Id.* at p. 31, ll. 4–12. If there is a preliminary rejection, then the router checks to see if any of the port’s existing multicast streams are being terminated (and therefore opening a space for the new request), and, if not, the router finally rejects the join request. *Id.* at p. 31, ll. 13–19. Li’s port control is performed by channel joining processing unit 122 of multicast router 91. *Id.* at p. 30, ll. 8–9, Fig. 12. “Upon receiving a multicast channel joining message from a STB user,” channel joining processing unit 122

determine[s] whether the number of channels being forwarded at the current service port is below the maximum number of accessed channels allowable, which is set for the port; and, if so, [it] instructs the multicast forwarding unit to start forwarding data of the new channel; otherwise, it is preliminarily determined that the channel is rejected.

Id. at p. 30, l. 21–p. 31, l. 12.

3. *Independent Claim 1*

Petitioner argues that Weyman and Li collectively teach all of the limitations of claim 1 and it would have been obvious to combine the references’ teachings to achieve the method of claim 1, relying on the testimony of Dr. Houh as support. Pet. 17–49 (citing Ex. 1002). Patent Owner, relying on the testimony of Dr. Olivier, argues in response that (1) Petitioner has not shown a sufficient motivation to combine the teachings of Weyman and Li, and (2) the references do not teach or suggest limitation [1k]. PO Resp. 10–23 (citing Ex. 2001); Sur-Reply 1–16.

a) Undisputed Limitations

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

Limitation [1a] recites “operating a network element.” Petitioner contends that Weyman teaches operating a distributed router, which is a “network element.” Pet. 26–27.

Limitation [1b] recites that “the network element further comprises multiple interconnected processing units and multiple ports.” Petitioner contends that Weyman discloses that the distributed router has multiple units (e.g., units 10 and 20 shown in Figures 1, 2, and 11), each of which processes IGMP messages and multicast streams. Pet. 27–28. The units are interconnected by a fabric link. *Id.* at 28 (citing Ex. 1005 ¶¶ 24–25). The distributed router also has multiple ports (i.e., user ports and fabric ports). *Id.* at 29 (citing Ex. 1005 ¶¶ 29, 60, 62, 64, 122–125).

Limitation [1c] recites that “each processing unit is assigned to a different subset of the multiple ports of the network element.” Petitioner relies on Weyman’s teachings that, in the distributed router shown in Figure 1, unit 10 has a first set of user ports and unit 20 has a second set of user ports. Pet. 29–30; *see* Ex. 1005 ¶ 64, Fig. 5.

Limitation [1d] recites that “each processing unit contains a processor for processing packets communicated over the different subset of the multiple ports to which the processing unit is assigned.” Petitioner contends that Weyman teaches that each unit has one or more Vbridges and a router that processes incoming packets, including those carrying the multicast streams, and forwards them to the appropriate egress port; therefore, each unit has a “processor.” Pet. 30–32.

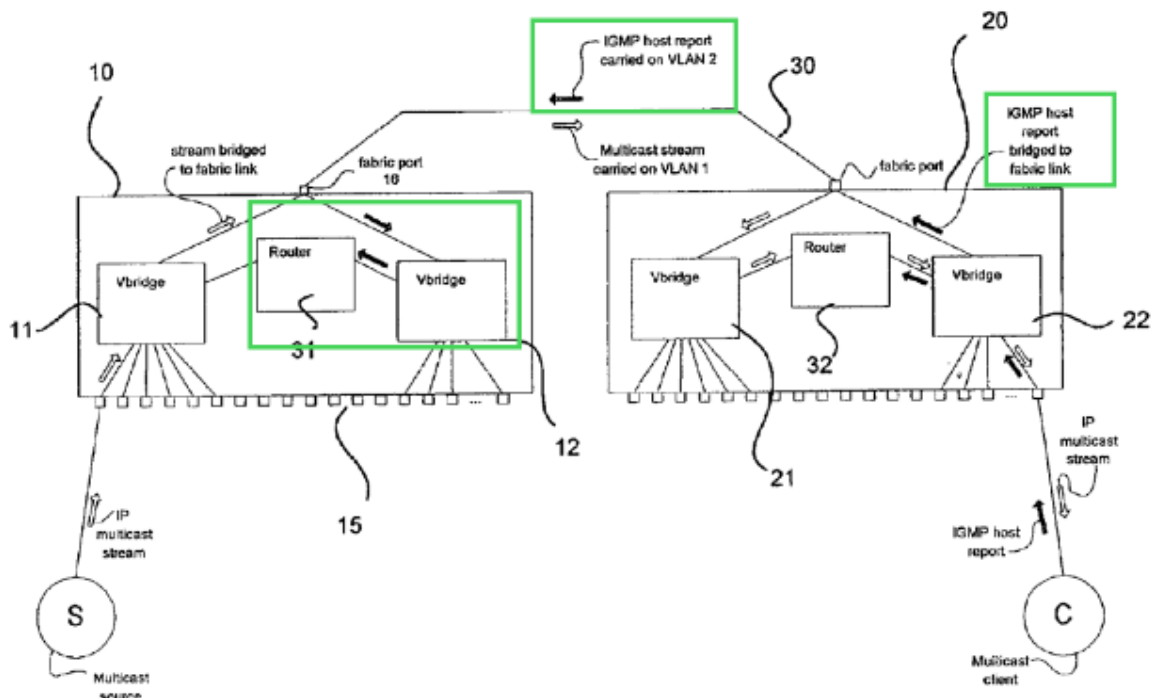
Limitation [1e] recites “storing in each processing unit a respective list, each list indicating all of one or more multicast packet streams that are permitted for forwarding by the network element, and further indicating which of the one or more ports each multicast packet stream is permitted to be forwarded to.” Petitioner argues that Weyman teaches that each unit in the distributed router includes multicast forwarding tables for the Vbridges and router. Pet. 34 (citing Ex. 1005 ¶ 128 (“[T]he bridge multicast forwarding tables and the router multicast forwarding tables should be used to control the forwarding of the multicast traffic to both user ports and fabric ports”). Petitioner also contends that Weyman teaches that the forwarding tables “will provide, for each multicast source and destination group pair, the rule by which the router’s data plane must forward or filter the stream.” *Id.* at 36 (quoting Ex. 1005 ¶ 111).

Limitation [1f] recites “receiving from a client a request relating to reception of a given multicast packet stream.” Petitioner contends that Weyman teaches that “[i]n order to join the destination group for the [multicast] stream, the client would need to send an IGMP host report.”⁶⁶ Pet. 39 (quoting Ex. 1005 ¶ 137). Sending such an IGMP request “enables multicast clients on a sub-network to register with their local routers in order to receive IP multicast streams.” *Id.* (quoting Ex. 1005 ¶ 160).

Limitation [1g] recites “distributing the request among the multiple processing units within the network element.” Petitioner argues that, as

⁶⁶ Dr. Houh explains that “[i]n some examples, a client device may request to ‘join’ a multicast stream by sending an ‘IGMP Membership Report’ (sometimes referred to as an ‘IGMP host report’ or simply ‘IGMP report’). . . . The IGMP Membership Report may include an identification of a multicast stream.” Ex. 1002 ¶ 37 (citing Ex. 1015, 4–8).

shown in Figure 11, Weyman teaches that “Vbridge 22 in device 20 would forward [the request] to the unit’s multicast router and also the fabric port. Vbridge 12 in unit 10 would then receive the [request] and forward it to the router 31.” Pet. 40–41 (quoting Ex. 1005 ¶ 137). Petitioner provides the following annotated version of Weyman’s Figure 11 to illustrate its contentions (*id.* at 41).



The annotated figure depicts in green where the IGMP host report, sent by multicast client C, is “bridged to [the] fabric link” and “carried on VLAN 2” to reach Vbridge 12 of unit 10. *Id.* Petitioner asserts that Weyman “teaches distributing the IGMP host report on all other units so that ‘[a]ny changes to the multicast distribution tree [are] kept synchronised for all the units in the fabric.’” *Id.* (quoting Ex. 1005 ¶ 162) (emphasis omitted).

Limitation [1h] recites “updating the respective list in each processing unit responsively to the request.” Petitioner contends that Weyman teaches that once the request for a multicast stream, in the form of the IGMP host

report, is distributed to each unit, the units “would use the report in the construction of the respective forwarding table in the router.” Pet. 42 (quoting Ex. 1005 ¶ 138) (emphasis omitted).

Limitation [1i] recites “selectively forwarding multicast packets associated with the given multicast packet stream by the processing units in accordance with the respective updated lists.” Petitioner argues that Weyman teaches that once the forwarding tables are updated, the multicast streams will only be forwarded to the ports that had been indicated by the tables as receiving the streams. Pet. 42–43 (citing Ex. 1005 ¶ 127).

Limitation [1j] recites that “operating the network element comprises aggregating two or more of the ports to form a high-capacity port.” Petitioner contends that Weyman teaches “aggregating two or more of the [physical connections] to form [an aggregated link]” on the distributed router and points to Figure 6, which illustrates such an aggregation and shows it forms a “high-capacity port.” Pet. 43–45 (quoting Ex. 1005 ¶ 50).

Limitation [1l] recites that “the request indicates that the given multicast packet stream is to be forwarded over the high-capacity port.” Petitioner argues that Weyman teaches that once the request (IGMP host report) is duplicated and distributed in Weyman, information is extracted from it, including the ingress port, to update the database entries. Pet. 46–47. That process can also be applied to the aggregated link. *Id.* at 47.

Limitation [1m] recites that “updating the list comprises modifying the list to indicate that the given multicast packet stream is permitted for forwarding over the high-capacity port only when the number of the multicast packet streams that are permitted for forwarding over the high-capacity port, including the given multicast packet stream, does not

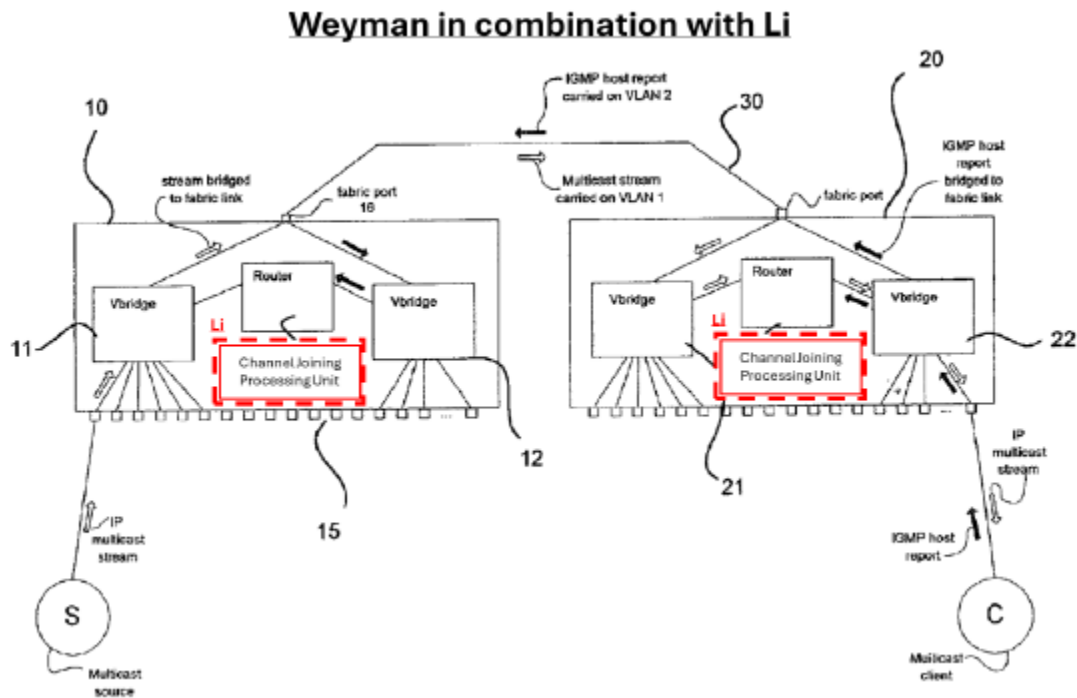
exceed the upper limit.” For similar reasons to those discussed below regarding limitation [1k], Petitioner argues that a person of ordinary skill in the art would have been motivated to combine Li’s port control with Weyman’s distributed router to implement an upper limit on the number of multicast streams permitted on a high-capacity port. Pet. 47–49; *see infra* Sections II.D.3.b–c.

Patent Owner in its Response does not dispute that Weyman and Li teach 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. 25–49; Ex. 1002 ¶¶ 104–152, 156–166.

b) Motivation to Combine

Petitioner explains why and how a person of ordinary skill in the art would have been motivated to combine the teachings of Weyman and Li. *See* Pet. 17–25. Petitioner asserts that “it was understood that controlling the amount of data being transferred over a particular interface (such as a port or an aggregated link) was important for reliability.” *Id.* at 18 (citing Ex. 1005 ¶ 24 (stating that “[w]hen several individual data switching units are connected to form a fabric, . . . sharing of the workload between the units” is an “[a]ncillary requirement[.]”)). Therefore, a person of ordinary skill in the art “would have been motivated to share the workload between units [in Weyman] to control the bandwidth of ports, including any aggregated links.” *Id.* Petitioner contends that Li discloses one such “port bandwidth control technique,” namely the use of a channel joining processing unit in a multicast router that limits “the maximum number of accessed multicast channels allowable.” *Id.* at 18–20 (quoting Ex. 1032, p. 28, l. 23–p. 29, l. 1) (emphasis omitted).

Petitioner argues that a person of ordinary skill in the art would have been motivated to “incorporate Li’s channel joining processing unit into Weyman’s distributed router so that Weyman’s distributed router does not overload a particular port and degrade the router’s reliability.” Pet. 22 (citing Ex. 1032, p. 5, ll. 5–23 (“In [a] controlled multicast service, the maximum number of multicast channels that can be selected of a service port needs to be controlled”). Petitioner provides the following modified version of Weyman’s Figure 11 to illustrate how it believes a person of ordinary skill in the art would have incorporated Li’s teachings into Weyman (*id.*).



The modified figure above shows Li’s channel joining processing unit (in red) added to each of Weyman’s units 10 and 20, where the channel joining processing units would “control the workload of individual ports in each unit as well as any aggregated link in order not to overload the ports/aggregated link.” *Id.* at 21–22.

Petitioner asserts that a person of ordinary skill in the art would have been motivated to combine the references' teachings in that manner for a number of reasons. First, Petitioner argues that because Weyman processes multicast join requests locally at a unit, an ordinarily skilled artisan "would have been motivated to control the assignment of multicast streams to ports locally at the unit as well"—as opposed to "global control of [a] port's workload," which "would have required the use of [the] internal fabric link to communicate with all units in the distributed router." Pet. 22–23 (citing Ex. 1005 ¶¶ 76, 98, 119, 137–139, 162).

Second, according to Petitioner, a person of ordinary skill in the art "would have understood that . . . bandwidth control is desirable for both individual ports and aggregated links because even aggregated links have a limited bandwidth" and that "Li's channel joining processing unit is equally applicable to both individual ports and aggregated links." Pet. 22–23.

Third, Petitioner argues that incorporating Li's channel joining processing unit into individual units of Weyman's distributed router would have amounted to "combining prior art elements . . . according to known methods . . . to yield predictable results" and "the use of [a] known technique . . . to improve similar devices . . . in the same way." Pet. 24. Petitioner asserts that its proposed combination would achieve the "predictable result of limiting the number of multicast streams carried on Weyman's ports and aggregated links." *Id.*

Fourth, Petitioner contends that it "would have been obvious to try" incorporating Li's channel joining processing unit because "there was a design or market need to control a port's bandwidth" and "only a finite number of ways" to do so. Pet. 25 (citing Exs. 1013, 1019, 1021, 1022).

Finally, Petitioner argues that a person of ordinary skill in the art would have had a reasonable expectation of success in combining the references' teachings as described above to achieve the method of claim 1 because "[b]oth Weyman and Li are directed to an IGMP based multicast router, and the ports (and any aggregated link) in Weyman and the service port in Li are both carrying multicast streams," and "Li's channel joining processing unit is configured to control the number of multicast streams on a particular port based on a straightforward determination of the number of multicast streams being carried by the particular port." Pet. 23–24. Petitioner's contentions regarding a motivation to combine and reasonable expectation of success are supported by testimony from Dr. Houh. *See* Ex. 1002 ¶¶ 83–103.

Patent Owner makes three sets of arguments in response.

First, Patent Owner points to various differences between Weyman and Li, arguing that the references "relate to two different types of products using two different types of media in two different types of networks." PO Resp. 10–13 (citing Ex. 2001 ¶¶ 40–45). Patent Owner contends that Weyman describes operations on "layer 2 ethernet" over a packet switched network, and aggregated links connected to ethernet switches, not to access networks or individual users. *Id.* at 10–12 (citing Ex. 1005 ¶¶ 1, 28, Fig. 6). In contrast, Patent Owner argues, Li does not operate on layer 2 and instead relates to access networks and access devices communicating over Digital Subscriber Line(xDSL) service ports. *Id.* at 11–13 (citing Ex. 1032, p. 72, ll. 21–23, p. 97, ll. 13–17, Fig. 9).

Regarding this first argument, we are not persuaded that the differences between Weyman and Li are so substantial that a person of ordinary skill in the art would not have been motivated to incorporate Li's

teachings regarding port control into the system of Weyman. Petitioner’s primary contention is that controlling the amount of data being transferred over a port or aggregated link in a network—so the port or link is not overloaded—was a known problem at the time of the ’394 patent. See Pet. 18–20. That assertion is supported by Weyman itself, which expressly discloses the need to “shar[e] . . . the workload between the units” in a distributed router.⁷ See Ex. 1005 ¶ 24. Recognizing that problem, a person of ordinary skill in the art would have looked to references like Li, which describes a technique for controlling port bandwidth at a multicast router. See Pet. 18–22; Ex. 1002 ¶¶ 86–87 (Dr. Houh explaining that a person of ordinary skill in the art “would have been motivated to find ways to distribute an amount of processing workload amongst switching units to better control bandwidth usage across ports, including any aggregated links,” and “would have readily recognized that Li discloses a technique for port bandwidth control”); Ex. 1032, p. 5, ll. 5–8 (stating that “the maximum number of multicast channels that can be selected of a service port needs to be controlled”).

“The motivation-to-combine analysis is a flexible one. ‘[A]ny need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.’” *Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1379 (Fed. Cir. 2023) (quoting *KSR*, 550 U.S. at 420). The fact that

⁷ Petitioner also cites other persuasive evidence indicating that this problem was known in the art, arguing that “ports have limited bandwidth” and that “[i]f a port has to transfer data at a rate higher than its maximum bandwidth, the port may drop packets and cause communication failures,” so “network devices can implement port bandwidth control” to avoid overloading the port. Pet. 8–9 (citing Exs. 1017, 1019, 1020; Ex. 1002 ¶¶ 44–46).

two references “address the same problem and that [one reference’s teaching] was a known way to address that problem is precisely the reason that there [is] a motivation to combine.” *Id.* at 1380; *see KSR*, 550 U.S. at 418–420 (holding that it is often necessary to “look to interrelated teachings of multiple patents” to determine whether there was a reason to combine known elements in the manner claimed, as “in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle”).

Here, regardless of any differences between the networks and access devices of Weyman and Li, the need to share workload and avoid overloading a multicast router port (or aggregation of ports) still applies. Also, as Petitioner points out, Li is similar to Weyman in a number of respects. *See* Reply 2–3. Both references relate to processing multicast requests. *See* Ex. 1005 ¶¶ 1 (“a fabric of units organised as a single virtual multicast router”), 91–93 (“Distributed Multicast Routing”); Ex. 1032, p. 5, ll. 25–27 (“multicast service processing method and system”). Both references also describe multicast router functionality and IGMP messaging. *See* Ex. 1005 ¶¶ 104, 137–139, 156–162, Figs. 1, 2, 8, 9; Ex. 1032, p. 2, l. 5–p. 4, l. 15, p. 26, ll. 13–17, Figs. 1, 2, 9; Pet. 23 (“Both Weyman and Li are directed to an IGMP based multicast router”). And, although Li’s access device communicates using xDSL service ports, it is coupled to a packet switched network (the “IP-based metropolitan area network”), from which it receives multicast data as IP packets. *See* Ex. 1032, p. 1, ll. 20–23, Figs. 1, 9; Ex. 1033, 69:20–70:8; PO Resp. 11–12.

Finally, the main case relied upon by Patent Owner is distinguishable. *See* Sur-Reply 5–6. In *Apple Inc. v. INVT SPE LLC*, 851 F. App’x 200 (Fed. Cir. 2021), the Court found substantial evidence for the Board’s finding of

no motivation to combine two references where, although the references both “involve[d] measuring transmission power, they [did] so for *different reasons*, on different time scales, and compare[d] the results to different thresholds.” *Id.* at 202–203 (emphasis added).⁸ By contrast, Weyman and Li both relate to multicast distribution over a network, describe similar network components and messaging, and, importantly, both recognize the need to share workload and avoid overloading router ports. The references do not perform their disclosed functions for different reasons, such that a person of ordinary skill in the art would not have considered combining them.

Second, Patent Owner argues that Petitioner fails to account for “Weyman’s teachings regarding controlled aggregation links,” specifically the fact that the controlled aggregation link in Figure 6 goes from one switch 91 to two different units 10 and 20. PO Resp. 13–20 (citing Ex. 2001 ¶¶ 50–56, 58). In Patent Owner’s view, a person of ordinary skill in the art combining Li with Weyman would not have modified Weyman’s Figure 11 like Petitioner contends, but rather would have modified Weyman’s Figure 6, which shows the aggregated links. *Id.* at 16–17.

⁸ We additionally note that as a nonprecedential case, *INVT* is not a controlling case authority on the Board.

Patent Owner provides the following modified version of Weyman's Figure 6 to illustrate its position (PO Resp. 17).

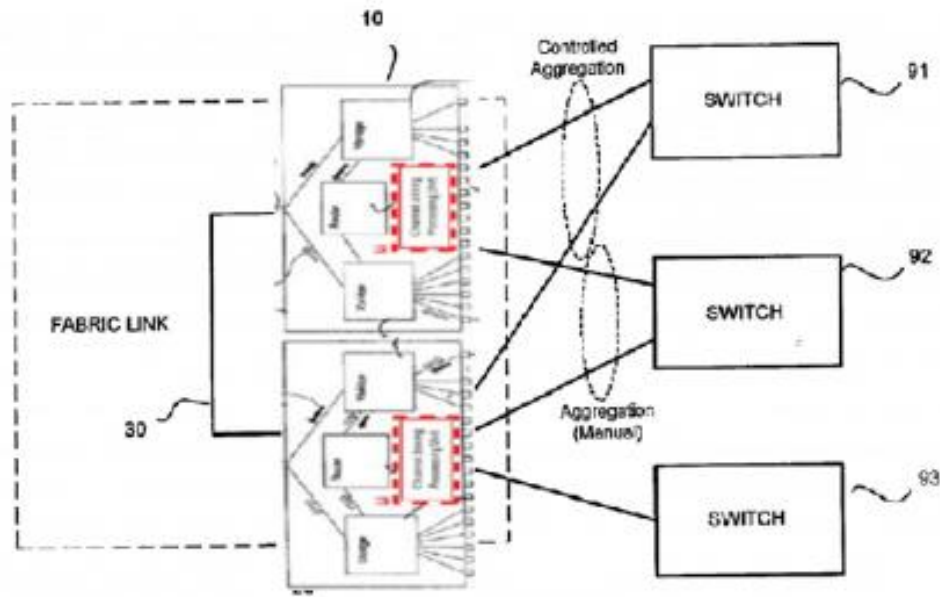


FIG.6

The modified figure above shows Petitioner's asserted modification adding Li's channel joining processing unit (in red) to units 10 and 20, but incorporated in Figure 6 of Weyman rather than Figure 11.

Patent Owner reasons that, as shown in the modified figure above, an IGMP host report may travel from switch 91 to either of units 10 and 20, but there is no way to determine which one beforehand. PO Resp. 18.

Therefore, according to Patent Owner, receipt of the IGMP host report must be "coordinated" between the two units for Li's channel joining processing units to "operate properly," which "requires using additional bandwidth on the fabric link." *Id.* at 18–20. "However, Weyman is clear that an object of the invention is to minimize the usage of bandwidth on the links between fabrics," and Li likewise is concerned with "increased bandwidth usage." *Id.* at 18–19 (citing Ex. 1005 ¶ 5; Ex. 1032, p. 80, ll. 6–22, p. 97, ll. 18–22).

Thus, in Patent Owner’s view, adding Li’s channel joining processing unit to each unit in Weyman would “contradict[] Weyman’s teachings.” *Id.* at 19–20.

We agree with Patent Owner that it is appropriate to consider Petitioner’s proposed combination, which incorporates Li’s channel joining processing unit into units 10 and 20 of Weyman, in the context of Figure 6. Petitioner relies on Figure 6 as teaching the aggregation of two ports to form a high-capacity port, as recited in limitation [1j]. Pet. 43–45. And Figure 6 shows the relied upon aggregation, with two links from switch 91 to ports in different units (one port of unit 10 and one port of unit 20). *See id.* at 44–45; Ex. 1005 ¶¶ 13, 50, 88–90. Although Figure 11 similarly depicts units 10 and 20 connected via fabric link 30, Weyman does not mention any aggregation in its description of that figure. *See* Ex. 1005 ¶¶ 136–140; Tr. 10:16–20 (Petitioner agreeing that “Figure 11 does not have the aggregation” of Figure 6 as shown).

Even using Patent Owner’s modified Figure 6 above, however, we do not agree that Petitioner’s asserted combination contradicts Weyman’s disclosure. Certain portions of Weyman do express a desire to avoid “unnecessary” bandwidth usage on the fabric link. *See* Ex. 1005 ¶¶ 5 (“A further object of the invention is to minimise the usage of bandwidth on links between the units of such a fabric.”), 98 (“A distributed multicast router . . . should not forward traffic across any fabric link unnecessarily.”), 119 (“[A] fabric containing a multicast router needs to minimise its use of the fabric link or links. It is very preferable that if a multicast stream may reach all the required egress ports without traversing a fabric link then it should not traverse that fabric link.”), 134–135 (“In order to control further the forwarding of multicast traffic so that it only traverses a fabric link if it

be necessary to do so, the bridge should only forward multicast traffic to a fabric port if it would be subsequently forwarded to a user port on another unit.”).

Importantly, though, Weyman discloses that some communication over the fabric link is needed for coordination. Paragraph 162 of Weyman discloses the following:

Report messages can be generated by the client units in order to route query messages or a change in an applicant's multicast membership. Changes in the multicast membership reported may affect the multicast distribution tree that the router maintains. Any changes to the multicast distribution tree must be kept synchronised *for all the units in the fabric*. One possibility is to cause merely one unit to process the IGMP report and to send updates to the remainder of the units in the fabric. Alternatively *the IGMP message could be delivered to every unit in the fabric for processing*.

Ex. 1005 ¶ 162 (emphasis added). Weyman thus recognizes that changes to what clients are to receive what multicast streams must be kept synchronized between all of the units and that one way to do so is for a unit receiving an IGMP host report to distribute the report to every other unit in the fabric. *See id.*; Pet. 16, 40–42 (relying on paragraph 162); Reply 5. Dr. Olivier agreed that, as described in paragraph 162, “when one of the units in the distributed router receives an IGMP host report, the IGMP host report is shared with all the units in the distributed router.”⁹ Ex. 1033, 36:5–18; *see also id.* at 37:13–22 (agreeing that nothing in Weyman indicates that the fabric link “cannot” be used for distributing an IGMP host report, but opining that “you should be very cognizant of any traffic you’re sending

⁹ Dr. Olivier in his declaration does not address paragraphs 135–139 or 162 of Weyman, which are relied upon by Petitioner and discussed herein. *See* Ex. 2001 ¶¶ 40–58.

over that fabric link, because in distributed routers such as the one in Weyman, these fabric links are the bottlenecks of the system”). Thus, contrary to Patent Owner’s argument, Weyman would not need to use “additional” bandwidth over the fabric link for coordination because it already discloses such coordination. See PO Resp. 18; Reply 4–5.

Weyman’s description of how IGMP host reports are used to build the forwarding tables also supports Petitioner’s position. Weyman discloses that “[i]n order to control further the forwarding of multicast traffic so that it only traverses a fabric link if it be *necessary* to do so, the bridge should only forward multicast traffic to a fabric port if it would be subsequently forwarded to a user port on another unit.” Ex. 1005 ¶ 135 (emphasis added). “The information required to determine whether another unit would forward a stream to a user port would be known without having to interrogate that unit” because of the process by which IGMP host reports are sent and distributed. *Id.* ¶ 136. Specifically,

[i]n order to join the destination group for the stream, the client would need to send an IGMP host report. *Vbridge 22 in device 20 would forward this report to the unit’s multicast router and also the fabric port. Vbridge 12 in unit 10 would then receive the report and forward it to the router 31.*

The control plane of the multicast routers in both units would use the report in the construction of the respective forwarding table in the router. As a result, the forwarding table of each multicast router would include the specification that the stream should be replicated and routed from VLAN 1 to VLAN 2.

The control plane of the router in both units would snoop the IGMP report and would use the report in the construction of the multicast forwarding tables in Vbridge 12. For unit 10, since the host report arrived into the unit through the fabric port 16, the multicast forwarding table for Vbridge 12 would include the

specification that the stream would be forwarded to the fabric port.

Id. ¶¶ 137–139 (emphasis added). The above excerpt expressly discloses unit 20 communicating an incoming IGMP host report over fabric link 30 to unit 10 so that both units can use it to build their forwarding tables and maintain synchronization. *See id.*, Fig. 11 (depicting the flow of communication with shaded arrows, including an “IGMP host report carried on VLAN 2” over fabric link 30); Pet. 16, 22–23, 40–42 (relying on paragraphs 137–139 of Weyman). Petitioner’s combination with Li does not contradict the teachings of Weyman because Weyman discloses using bandwidth on the fabric link to maintain synchronization between the units.¹⁰

Third, we address Patent Owner’s argument that Petitioner is taking inconsistent positions, arguing in the Petition that “local control, as opposed to global control, of the port’s workload is desirable,” but arguing in the Reply that “global control rebuts [Patent Owner’s] argument because global control is required for all units in Weyman’s distributed router to receive IGMP reports regardless of which unit initially receives the report.” Sur-Reply 6–7 (citing Pet. 23; Reply 5).

We disagree with Patent Owner. Petitioner argues in the Petition that a person of ordinary skill in the art would have been motivated to incorporate Li’s channel joining processing unit into “individual units” of

¹⁰ For similar reasons, Patent Owner is incorrect that “there is no guarantee that the same network channel joining processing unit on one network unit will receive every message because multicast joining messages may go to any network unit.” *See* PO Resp. 19. If messages are distributed to other units, as described in Weyman, the other units would be guaranteed to receive them. *See* Ex. 1005 ¶¶ 137–139, 162.

Weyman's router to "control the assignment of multicast streams to ports locally at the unit"—as opposed to exercising "global control" of all ports' workloads, which would have required the use of bandwidth on the fabric link to do so. Pet. 22–23. Control over outgoing multicast streams, however, is different from coordination with respect to incoming IGMP host reports. As explained above, Weyman expressly teaches distribution of an incoming IGMP host report over the fabric link to another unit. See Ex. 1005 ¶¶ 137–139, 162. Once that occurs, the receiving unit can update its forwarding table and no further communication is necessary—control of later outgoing multicast streams takes place locally. See *id.* ¶¶ 119, 140 ("[Unit 10] determine[s], by examination of its multicast router's forwarding table," whether "the stream should be routed" to a port of unit 10 or "to VLAN 2 by the fabric . . . so that unit 20 may route it"); Tr. 17:4–18:7 (Petitioner explaining that "synchronization occurs locally because all the units are receiving the IGMP reports, and then locally updating their own forwarding table without communicating further with the other units in the distributed router").

Based on the full trial record, we conclude that Petitioner has shown sufficiently that a person of ordinary skill in the art would have been motivated to modify Weyman's system based on the teachings of Li and would have had a reasonable expectation of success in doing so. As Petitioner explains in detail, an ordinarily skilled artisan would have been motivated to "share the workload between units to control the bandwidth of ports, including any aggregated links," and, specifically, to "incorporate Li's channel joining processing unit into Weyman's distributed router so that Weyman's distributed router does not overload a particular port and degrade the router's reliability." See Pet. 18–24. We credit the testimony of

Dr. Houh in that regard, as it is explained in sufficient detail and supported by specific cited disclosures in Weyman and Li, as explained above. *See* Ex. 1002 ¶¶ 83–102.¹¹

c) Disputed Limitation [1k]

Limitation [1k] recites that “aggregating the ports comprises setting an upper limit on a number of the multicast packet streams that are permitted for forwarding over the high-capacity port.” Petitioner argues that

Li teaches that “each xDSL service port is configured with the maximum number of accessed multicast channels allowable.” . . . When the multicast router receives a multicast join request, the Weyman/Li[] channel joining processing unit determines whether the number of channels being forwarded at the port or aggregated link is below the maximum number of accessed channels allowable, and if not, the channel joining processing unit rejects the multicast join request. . . . Accordingly, the distributed router in Weyman/Li sets an upper limit on a number of multicast streams that are permitted for forwarding over Weyman’s ports as well as the aggregated link (“high-capacity port”), as described in Section XI.A.1 [of the Petition].

Pet. 45–46 (quoting Ex. 1032, p. 28, l. 23–p. 29, l. 1; citing Ex. 1032, p. 31, ll. 4–19) (emphasis omitted).

Patent Owner argues that Weyman and Li do not teach or suggest limitation [1k]. PO Resp. 20–23 (citing Ex. 2001 ¶¶ 60–65). Patent Owner argues that Li’s “xDSL link . . . cannot be an aggregated link or a high-capacity port” because it is “always a single link,” and Li also “does not describe using a channel joining processing unit with an aggregated

¹¹ Given our agreement with Petitioner on the points explained above, we need not address Petitioner’s additional argument that the asserted combination with Li would have been “obvious to try.” *See* Pet. 25; Ex. 1002 ¶ 103.

link.” *Id.* at 21. Patent Owner further contends that “Li’s channels are content provider or program channels sent over an xDSL link,” which a person of ordinary skill in the art would understand to “typically have multiple streams, including at least one video stream and at least one audio stream.” *Id.* at 22 (citing Ex. 1032, p. 26, ll. 13–17). As support, Patent Owner cites a patent published in 2007, U.S. Patent No. 8,516,531 B2 (Ex. 2005, “the ’531 patent”), disclosing that “program channels contain both video and audio multicast streams.” PO Resp. 22–23 (citing Ex. 2005, col. 1, ll. 19–23, col. 4, ll. 43–50, col. 6, ll. 26–33). According to Patent Owner, “[d]ifferent program channels correspond to different multicast packet streams,” so “setting an upper limit on a number of program channels in Li is different than setting an upper limit to the number of multicast packet streams.” *Id.* at 23.

Patent Owner’s arguments do not account for the specific combination asserted by Petitioner. Petitioner relies on the combined teachings of Weyman and Li, not just Li, as allegedly teaching limitation [1k]. See Pet. 45–46. The term “multicast packet stream” is introduced earlier in claim 1 in limitation [1e]. Petitioner argues—and Patent Owner does not dispute—that Weyman’s “multicast streams” (also referred to as “multicast traffic”) constitute “multicast packet streams.” See *id.* at 35–39; *supra* Section II.D.3.a. “Multicast packet stream” also appears in limitations [1f], [1i], [1l], and [1m], where Petitioner again relies on Weyman’s multicast streams, and Patent Owner does not disagree. See Pet. 39–40 (citing Ex. 1005 ¶ 160 (“The IGMP protocol enables multicast clients on a sub-network to register with their local routers in order to receive IP multicast streams.”)), 42–43, 46–49. Then, when addressing limitation [1k], Petitioner argues that the combined Weyman-Li system would “set[] an

upper limit on a number of multicast streams that are permitted for forwarding *over Weyman's ports as well as the aggregated link.*" *Id.* at 45–46 (emphasis added). Petitioner further references Section XI.A.1 of the Petition, where Petitioner similarly argues that incorporating Li's channel joining processing unit into Weyman's distributed router would have the "predictable result of limiting the number of multicast streams carried on *Weyman's ports and aggregated links.*" *See id.* at 24 (emphasis added), 45–46. Dr. Houh in his testimony provides a similar analysis. *See* Ex. 1002 ¶¶ 99–102, 153–155; Ex. 1034, 70:6–10, 73:5–10 (testifying that "Li's channel joining processing unit is being used to count the number of multicast streams that is disclosed in Weyman").

Thus, Petitioner is relying on Weyman's teaching of "multicast packet streams" and a "high-capacity port" and additionally "relying on an application of Li's channel joining processing unit to Weyman's distributed router to control the number of multicast packet streams indisputably taught by Weyman." *See* Pet. 45–46; Reply 11.

To the extent Patent Owner's position is that *Li's* channels are not "multicast packet streams," or that *Li* does not disclose a "high-capacity port," such arguments are unavailing, given Petitioner's asserted combination. *See* PO Resp. 21–23; *Palo Alto Networks, Inc. v. Centripetal Networks, LLC*, 122 F.4th 1378, 1386 (Fed. Cir. 2024) ("Where, as here, the grounds for obviousness are based on a specific combination of references, arguments that 'attack the disclosures of the two references individually' lack merit. . . . [References asserted in an obviousness combination] must be read together, not in isolation."). Petitioner has made a sufficient showing that Weyman teaches "multicast packet streams" and a "high-capacity port," and that Weyman, as modified based on *Li*, teaches the full limitation of

“aggregating the ports compris[ing] setting an upper limit on a number of the multicast packet streams that are permitted for forwarding over the high-capacity port.”

Further, even if we were to agree with Patent Owner that Li must teach “multicast packet streams,” we disagree with Patent Owner’s reading of Li. Patent Owner’s position is that “Li’s channels are content provider or program channels sent over an xDSL link,” not “multicast packet streams.”¹² PO Resp. 22; Sur-Reply 14–15. Also, according to Patent Owner, Li’s “channels” would have multiple streams (“at least one video stream and at least one audio stream”), so limiting the number of “channels” in Li is different from limiting the number of “multicast packet streams.” PO Resp. 22.

As Petitioner points out, though, Li’s description of a “channel” is similar to what the ’394 patent describes as an exemplary embodiment of a “multicast packet stream.” See Reply 14–15. Li describes a “channel” as the flow of data (i.e., communication packets) that carry multicast content, such as an IPTV channel. See, e.g., Ex. 1032, p. 3, ll. 9–22 (referring to a “channel” as an IPTV channel that has “video flow”), p. 3, l. 23–p. 4, l. 15 (describing “multicast channels” as IPTV channels), p. 4, ll. 16–26 (describing that when a quit request is processed, a message is sent to check if any other users are “watching the channel” and, if not, “multicast flow of the channel is cut immediately”). For example, Li discloses that

¹² Again, the parties confirmed at the oral hearing that neither proposes an interpretation for the term “multicast packet stream” or advocates for the party’s respective construction from the district court case. See Tr. 20:3–16, 21:8–16, 44:15–45:16; *supra* Section II.B (“Claim Interpretation”).

in order to provide all users with an [IPTV] experience similar to traditional CATV (Cabled TV), a channel switching request of a single user has to be processed within 1 second

In order to solve the delay problem in multicast processing, there is a solution in which all multicast programs are pushed to the access device. However, this solution may lead to a significant increase of fixed bandwidth occupied by multicast when there is a large number of *multicast channels*. For example in the case of 1000 *multicast channels*, each of which occupies a bandwidth of 5M on average, a fixed bandwidth of 20 G is needed from an edge device to an access device in order to push multicast traffic.

Id. at 3:23–4:8 (emphasis added). In that discussion, Li is referring to a “multicast channel” as the packets carrying an IPTV channel, which has a 5M average bandwidth. *See id.* Similarly, the ’394 patent discloses that, in an exemplary embodiment, “[s]ource 24 may transmit multicast packet streams that carry . . . live IP Television (IPTV) channels . . . or any other suitable type of multicast content.” Ex. 1001, col. 5, l. 66–col. 6, l. 3; *see also id.* at col. 2, ll. 1–3 (“selectively forwarding multicast packets associated with the given multicast packet stream”).

Also, Li discloses that its “channel” is requested and stopped with an IGMP message. Ex. 1032, p. 3, ll. 10–15 (“In IPTV service implemented by multicast, the operations of a user switching channels include: sending an IGMP quitting message of an original channel and sending an IGMP joining message of a new channel.”), p. 33, ll. 17–18 (“The user to order a multicast channel sends to the access device through the STB an IGMP message requesting for selecting the multicast channel.”). The ’394 patent similarly describes a “request specif[ying] a requested action selected from a group of actions consisting of receiving the given multicast packet stream and stopping to receive the given multicast packet stream,” which “may conform

to . . . Internet Group Management Protocol (IGMP).” Ex. 1001, col. 3, ll. 33–41; *see also id.* at col. 7, ll. 46–52 (“For example, in an IPTV application, when a multicast client 28 (e.g., a set-top box) switches (‘zaps’) from one television channel to another, the client sends a request to stop receiving the content of the previous channel and to start receiving the content of the new channel. In some embodiments, the request conforms to the IGMP . . . protocol[] . . .”).

The similar descriptions of Li’s “channels” and the ’394 patent’s exemplary “multicast packet streams” as packets carrying an IPTV channel, which are started and stopped with IGMP messages, support Petitioner’s contention that Li (in addition to Weyman, as discussed above) teaches “multicast packet streams.” For the same reasons, we disagree with Patent Owner that Weyman and Li “are ‘different in kind’ because Weyman is directed to limiting streams and Li [is] directed to limiting channels,” such that the combination would lead to “unexpected results.” *See* Sur-Reply 3.

Further, to the extent Patent Owner relies on the ’531 patent as evidence of how a person of ordinary skill in the art would have understood Li’s “channel” disclosure, that patent cannot contradict the disclosures of Li cited above, which we find to be similar to the ’394 patent. Further, we are not persuaded that the ’531 patent reflects how an ordinarily skilled artisan would have understood Li’s use of the word “channel.” The relied upon portion of the ’531 patent discloses that “[v]ideo stream 202 *typically* contains multimedia content corresponding to a program channel, such as video and audio content of a content provider’s channel.” Ex. 2005, col. 6, ll. 30–33 (emphasis added). And the exemplary embodiment described in the ’531 patent is a single video stream encoded as “an MPEG-2 transport stream” (although the reference states that its teachings may be applied to

multiple video streams). *See id.* at col. 4, ll. 43–50, col. 6, ll. 18–25 (“Although the exemplary illustration refers only to a single multicast video stream, it should be appreciated by those skilled in the art that the concepts described herein may apply to multiple incoming video streams”), 33–35, col. 8, ll. 44–47. Thus, the ’531 patent does not indicate that a person of ordinary skill in the art would have understood Li’s “channel” to always contain multiple streams (e.g., audio and video), as Patent Owner contends.

Finally, referring to its earlier arguments regarding a motivation to combine, Patent Owner contends that it would not be possible for a channel joining processing unit in the combined Weyman-Li system to determine whether the number of channels being forwarded is below a maximum number allowable “because no single channel joining processing unit is guaranteed to receive both the channel joining and channel quit messages.” PO Resp. 21–22. As explained above, however, if IGMP messages are distributed to other units, as expressly disclosed in Weyman, the other units would be guaranteed to receive them. *See supra* Section II.D.3.b; Reply 10; Ex. 1005 ¶¶ 137–139, 162.

Petitioner’s explanation regarding the combination of Weyman and Li for limitation [1k], supported by the testimony of Dr. Houh, which we credit, is persuasive. *See* Pet. 45–46; Ex. 1002 ¶¶ 153–155. Based on the full trial record, we find that Weyman and Li teach limitation [1k].

d) Conclusion

Petitioner has shown sufficiently that Weyman and Li collectively teach all of the limitations of claim 1 and that a person of ordinary skill in the art would have been motivated to combine the references’ disclosures to

arrive at the method of claim 1 with a reasonable expectation of success. *See* Pet. 17–49; Ex. 1002 ¶¶ 83–102, 104–166. 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 based on Weyman and Li under 35 U.S.C. § 103(a).

4. Independent Claim 11

Independent claim 11 is similar to claim 1, but recites a network element rather than a method. Petitioner largely refers to its earlier arguments regarding claim 1. *See* Pet. 51–56. Patent Owner likewise refers to its earlier arguments regarding claim 1, asserting that limitation [11j] is “substantially similar” to limitation [1k]. PO Resp. 24. We disagree with Patent Owner’s arguments for the reasons explained above. *See supra* Section II.D.3. In view of those reasons and in light of Petitioner’s arguments and supporting evidence, we are persuaded that Petitioner has proven, by a preponderance of the evidence, that claim 11 also would have been obvious based on Weyman and Li under 35 U.S.C. § 103(a). *See* Pet. 51–56; Ex. 1002 ¶¶ 178–190.

5. Dependent Claims 4, 6, 7, 14, and 17

Patent Owner does not argue dependent claims 4, 6, 7, 14, and 17 separately from their respective parent claims 1 and 11. *See* PO Resp. 29. We disagree with Patent Owner’s arguments regarding parent claims 1 and 11 for the reasons explained above. *See supra* Sections II.D.3–4. 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 4, 6, 7, 14, and 17 would have

been obvious based on Weyman and Li under 35 U.S.C. § 103(a), for the reasons stated by Petitioner. See Pet. 49–51, 56; Ex. 1002 ¶¶ 167–177, 191–192.

*E. Obviousness Ground Based on Weyman, Li, and Rooholamini
(Claims 5 and 15)*

1. Rooholamini

Rooholamini is a published U.S. patent application titled “Managing Multicast Groups.” Ex. 1008, code (54). Rooholamini describes methods for managing multicast groups “[i]n a system supporting multicast operations between endpoints . . . coupled to a switch fabric.” *Id.* at code (57). Multicast manager 232 for switching fabric 210 “may track path counts by maintaining port path count tables 234 associated with the multicast groups that have been created by the fabric manager 230.” *Id.* ¶ 29. “For each of the multicast groups, port path count tables 234 track the number of paths through the ports of the switches configured to route multicast packets sent by members of the respective multicast groups.” *Id.*

Figure 4 of Rooholamini is reproduced below.

	P ₀	P ₁	...	P _m
S ₁	2	1	0	0
S ₂	0	3	0	1
...	...	...	...	...
S _n	0	0	0	0

434

FIG. 4

Figure 4 depicts exemplary port path count table 434 for a multicast group, with rows corresponding to individual switches, columns corresponding to

ports of those switches, and number entries corresponding to the number of multicast streams handled by each respective switch and port. Ex. 1008 ¶ 30. As shown in the figure, “two multicast paths go through the port P_0 of the switch S_1 , one multicast path goes through port P_1 of the switch S_1 , three multicast paths go through port P_1 of the switch S_2 , one multicast path goes through port P_m of the switch S_2 , and no multicast paths go through the other ports of the other switches.” *Id.*

2. Claim 5

Claim 5 depends from claim 1 and recites that

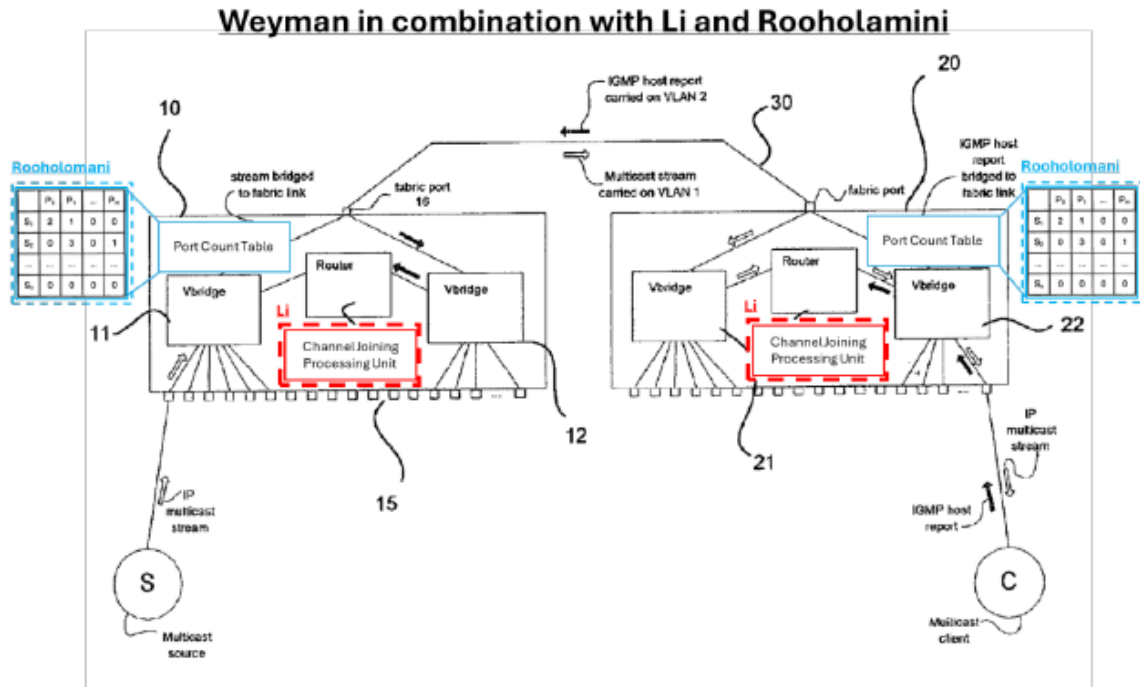
the ports forming the high-capacity port are assigned to at least two of the processing units, and . . . updating the list comprises holding respective local copies of the number of the multicast packet streams that are permitted for forwarding over the high-capacity port, updating the local copies based on the distributed request, and selectively updating the list in each of the at least two processing units based on the respective local copies.

Petitioner relies on Weyman and Li as teaching the limitation that “the ports forming the high-capacity port are assigned to at least two of the processing units,” citing the aggregation of one port of unit 10 with another port of unit 20 shown in Figure 6 of Weyman. Pet. 61. Petitioner relies on Rooholamini for the “updating the list” limitations of claim 5, arguing that in the asserted combination, Rooholamini’s port path count table would be stored “locally” in each unit and would be updated over time based on each received “request” (i.e., IGMP host report). *Id.* at 60, 62–64 (citing Ex. 1008 ¶ 29 (disclosing that the port path count tables “track” the number of multicast paths through particular ports)).

Petitioner further explains why and how a person of ordinary skill in the art would have been motivated to combine the teachings of Rooholamini with Weyman and Li. *See* Pet. 56–61. Petitioner argues that in the combined Weyman-Li system discussed above with respect to parent claim 1, the “channel joining processing unit accepts or rejects a request for a multicast stream at a particular port based on the number of multicast streams being carried by the particular port.” *Id.* at 56. Therefore, a person of ordinary skill in the art “would have been motivated to keep a record of the number of multicast streams being carried by ports in the Weyman/Li[] distributed router.” *Id.* at 56–57. Petitioner contends that Rooholamini teaches one such way of doing so, namely the use of a port path count table that maintains “a real-time count of the number of multicast streams passing through a particular port of a particular switch.” *Id.* at 57–58 (citing Ex. 1008 ¶¶ 29–30, 35).

Petitioner argues that an ordinarily skilled artisan would have been motivated to modify the combined Weyman-Li system to “identif[y] the number of streams handled by the ports in the distributed router (including the aggregated link)” using Rooholamini’s port path count table, which would allow the channel joining processing unit to perform its function of “control[ling] the number of multicast streams for a particular port using the port count available locally in the unit.” Pet. 58.

Petitioner provides the following modified version of Weyman's Figure 11 to illustrate how it believes a person of ordinary skill in the art would have incorporated Rooholamini's teachings into the combined system of Weyman and Li (Pet. 59).



The modified figure above shows Li's channel joining processing unit (in red) and Rooholamini's port path count table (in blue) added to each of Weyman's units 10 and 20. *Id.* at 58–59. According to Petitioner, using the port path count table in each unit would allow the channel joining processing unit to track the number of multicast streams handled by the ports as well as the aggregated link and thereby “manage the bandwidth of the aggregated link.” *Id.* at 59–60. Petitioner's contentions regarding a motivation to combine and reasonable expectation of success are supported by testimony from Dr. Houh. *See* Ex. 1002 ¶¶ 193–200.

Patent Owner in its Response does not dispute that the asserted references teach the limitations of claim 5,¹³ but argues that a person of ordinary skill in the art would not have been motivated to add Rooholamini's port path count table to the combined Weyman-Li system because doing so would require "further synchronization efforts in the distributed router system because multicast messages traveling to each Vbridge need to be coordinated in some way." PO Resp. 29–31 (citing Ex. 2001 ¶¶ 86–88). According to Patent Owner and Dr. Olivier, "additional synchronization efforts would lead to increased bandwidth usage in the fabric, which contradicts Weyman's teachings to minimize fabric bandwidth usage." *Id.*

We disagree for similar reasons to those explained above for claim 1. *See supra* Section II.D.3.b. Although Weyman expresses a desire to avoid "unnecessary" bandwidth usage on the fabric link, *see* Ex. 1005 ¶¶ 5, 98, 119, 134–135, certain communication over the fabric link is necessary for synchronization. Weyman expressly discloses that an "IGMP message

¹³ In its Sur-Reply, Patent Owner argues for the first time that Weyman, Li, and Rooholamini do not teach "updating the list in each of the at least two processing units" as recited in claim 5 because "the Weyman/Li combination does not teach coordinating IGMP messages received by different channel joining processing units in Weyman's distributed router." Sur-Reply 17. This is a new argument not entitled to consideration. *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> ("Trial Practice Guide") ("Generally, a reply or sur-reply may only respond to arguments raised in the preceding brief. . . . '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."). Regardless, we disagree with Patent Owner's argument regarding the Weyman-Li combination for the reasons explained above.

could be delivered to every unit in the fabric for processing.” *Id.* ¶ 162; *see also id.* ¶¶ 137–139 (describing unit 20 forwarding an IGMP host report over the fabric link to unit 10 so the routers of both units can construct their forwarding tables). In Petitioner’s asserted combination (assessed with respect to Figure 6 or Figure 11 of Weyman), an incoming IGMP host report would be distributed to all of the units, which would result in the port path count tables being synchronized with each other (since they are updated whenever there is a change in the multicast streams carried by the various ports). *See* Pet. 63–64; Reply 18. Therefore, contrary to Patent Owner’s argument, no “additional synchronization efforts” would be needed beyond what Weyman already performs. *See* PO Resp. 31.

We conclude that Petitioner has shown sufficiently that Weyman, Li, and Rooholamini teach the limitations of claim 5 and that a person of ordinary skill in the art would have been motivated to further modify the combined Weyman-Li system based on the teachings of Rooholamini and would have had a reasonable expectation of success in doing so. *See* Pet. 56–64; Ex. 1002 ¶¶ 193–210. Based on all of the evidence of record, we determine that Petitioner has proven, by a preponderance of the evidence, that claim 5 would have been obvious based on Weyman, Li, and Rooholamini under 35 U.S.C. § 103(a).

3. *Claim 15*

Claim 15, which depends from claim 11, recites limitations similar to those of claim 5, and the parties argue the claims together. *See* Pet. 56–64; PO Resp. 29–31; Reply 17–19; Sur-Reply 16–17. For the reasons set forth in the above discussion of claim 5, we are persuaded that Petitioner has proven, by a preponderance of the evidence, that claim 15 also would have

been obvious based on Weyman, Li, and Rooholamini under 35 U.S.C. § 103(a). *See* Pet. 56–64; Ex. 1002 ¶¶ 193–211.

*F. Obviousness Ground Based on Weyman, Jain, and LeMaire
(Claims 8 and 18)*

1. Jain

Jain is a published U.S. patent application titled “System and Method for Controlling Boot-Up Process in a Communications Network Switch.” Ex. 1010, code (54). Jain discloses controlling the boot-up process in a communication device (referred to as a “network node”) that involves effectuating a “Link Down” condition on ports of the network node to allow initialization and configuration of the device’s software to occur before reactivating the ports for communication. *Id.* at code (57), ¶¶ 19–21. Controlling the boot-up process in this way avoids deleterious effects to the integrity of the traffic received on the ports. *Id.* ¶ 20.

Figure 1 of Jain is reproduced below.

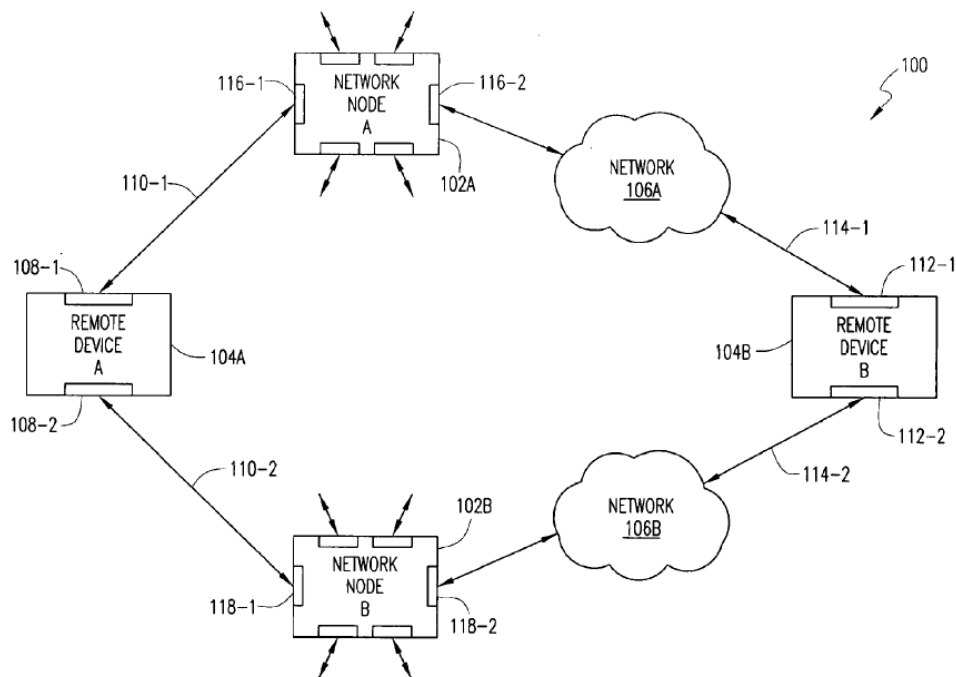


FIG. 1

Figure 1 depicts network environment 100 comprising network nodes 102A and 102B having various ports for communicating with remote devices 104A and 104B and networks 106A and 106B. Ex. 1010 ¶¶ 16–18.

Network node 102A may be “designated as a primary or active node operable to serve remote device 104A via a link 110-1” and network node 102B may be “designated as a secondary or standby node operable to serve remote device 104A via a link 110-2.” *Id.* ¶ 17. Jain discloses that

[w]hen network node 102A is down for some reason, e.g., a catastrophic switch software and/or hardware failure, reset, power down, rebooting, etc., its link port interfaces are deactivated or de-energized, including the device-side and network-side interfaces. Accordingly, upon sensing the link down condition on link 110-1, remote device 104A switches over to its hot standby port 108-2 for communicating with remote device 104B via network node 102B. When network node 102A is powered up again (i.e., power-on or system reset condition), it engages in a controlled boot-up process thereafter, . . . such that its link ports do not exhibit spurious logic conditions that may cause the interfacing entities (i.e., remote devices as well as other network nodes) to commence network traffic while the switch software (i.e., system software) is still in an incomplete operational state. . . . [S]uch a situation gives rise to various deleterious effects with respect to the integrity of the traffic received at the network node.

Id. ¶ 19.

Figure 2 of Jain is reproduced below.

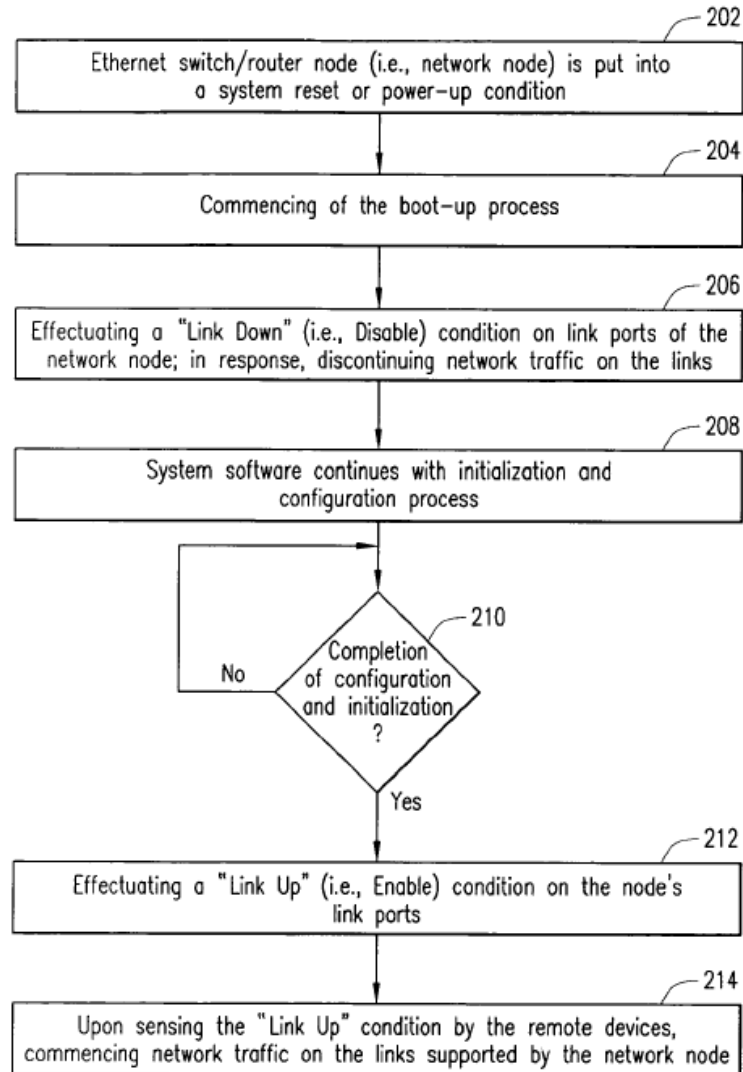


FIG. 2

Figure 2 depicts a flowchart of Jain's "controlled boot-up process."

Ex. 1010 ¶¶ 19–20. At blocks 202 and 204, "[w]hen the Ethernet node . . . is put into a system reset or power-up condition, the boot-up process involving initialization and configuration of both hardware and system software is commenced." *Id.* ¶ 20. Then, at block 206, "[u]pon detecting the reset condition and in response thereto, a 'Link Down' condition is effectuated on

at least a portion of the link ports of the network node.” *Id.* Jain discloses that

[w]hen the Link Down condition is sensed by the entities (i.e., devices and nodes) connected to the network node via respective links, network traffic on the links is discontinued That is, e.g., a remote device that is transmitting network traffic via a particular link to the network node that has initiated the boot-up processes may cease data transmission on that interface. In one implementation, the Link Down condition may be effectuated by maintaining an appropriate logic level on a particular pin (e.g., TX DISABLE pin) associated with a physical layer (“PHY”) device of the network node that is responsible for interfacing with at least a portion of the link ports.

Id. Next, at blocks 208 and 210, “[w]hile the Link Down (or, disabled) condition is maintained on the link ports, the system software of the network node continues with its initialization and configuration process until it is complete and operational.” *Id.* ¶ 21. At block 212, “upon a suitable indication to the port hardware that the system software has completed the requisite configuration process, a ‘Link Up’ condition is effectuated on the ports,” for example, by providing “an appropriate logic signal (e.g., a logic low) . . . on TX DISABLE pins of the PHY device(s) interfacing with the link ports in order to indicate the ‘enabled’ state of the ports.” *Id.* Finally, at block 214, “[u]pon sensing the Link Up condition by the entities, network traffic is commenced on the links of the network node, thereby advantageously avoiding data uncertainty and/or loss at the node during the boot-up period.” *Id.*

2. *LeMaire*

LeMaire is a published U.S. patent application titled “Method and Apparatus for Transparent Intermediate System Based Filtering on a LAN of

Multicast Packets.” Ex. 1011, code (54). LeMaire discloses a bridge for handling multicast streams. *Id.* at code (57), col. 7, ll. 57–63. Bridge 62 includes Bridge Filtering Table (BFT) 88 “contain[ing] entries for each [end system local area network (ES LAN)] address from which a packet is received,” where “[e]ach entry . . . includes a means for indicating a port to which that address is connected.” *Id.* at col. 8, ll. 8–15. “[B]ridge 62 gradually learns about ESs to which it is connected by reading the LAN source addresses of packets received on its ports.” *Id.* at col. 8, ll. 15–18. LeMaire describes a process in which, “[o]n power up or system reset,” bridge 62 “transmits IGMP Query packets at regular intervals out of each of its ports A–E.” *Id.* at col. 9, ll. 12–15. “In response to IGMP Queries, ESs attached to bridge 62 that wish to receive [wide area network multicast packets (WMPs)] will transmit IGMP Reports” to bridge 62. *Id.* at col. 9, ll. 21–23. “Each time bridge 62 hears a Report on one of its ports, it stores an identifier for the port and the LAN Group address in BFT 88 indexed according to that LAN Group Address and indicating on which port the Report Packet was received” *Id.* at col. 9, ll. 26–34.

3. *Independent Claim 8*

Petitioner argues that Weyman, Jain, and LeMaire collectively teach all of the limitations of claim 8 and it would have been obvious to combine the references’ teachings to achieve the method of claim 8, relying on the testimony of Dr. Houh as support. Pet. 68–81 (citing Ex. 1002).

a) Undisputed Limitations

For the preamble of claim 8 and claim elements designated as [8a]–[8i], Petitioner refers to its earlier analysis of how Weyman teaches similar limitations [1a]–[1i]. Pet. 75–77. For limitation [8j], “wherein operating the network element comprises initializing a new processing unit added to the network element,” Petitioner contends that “Weyman discloses that the distributed router ‘can accommodate the addition or removal of unit[s]’ . . . and ‘[i]f a unit with a default configuration joins the fabric[,] it needs to update its configuration to that of the distributed multicast router.’” *Id.* at 77 (quoting Ex. 1005 ¶¶ 69, 156) (emphasis omitted). For limitation [8m], “after constructing the list, activating the ports to which the new processing unit is assigned,” Petitioner relies on Jain’s disclosure that “once the new unit completes the initialization process—including the construction of the forwarding table—the unit activates the previously disabled user ports” (i.e., setting the “Link Up” condition in block 212 of Figure 2 above). *Id.* at 80–81 (citing Ex. 1010 ¶¶ 7, 21). Patent Owner does not dispute that Weyman and Jain teach these limitations. Petitioner’s analysis, supported by the testimony of Dr. Houh, which we credit, is persuasive. *See* Pet. 75–78, 80–81; Ex. 1002 ¶¶ 240–253, 266–267. We now turn to the remaining limitations [8k] and [8l], where we also discuss Petitioner’s asserted motivations to combine.

b) Disputed Limitation [8k]

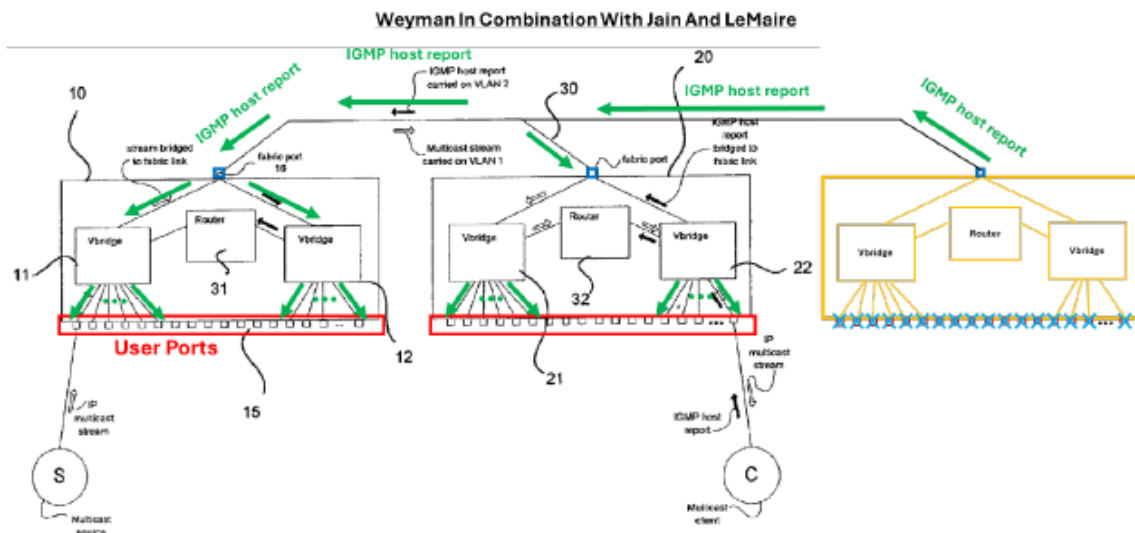
Limitation [8k] recites “deactivating the ports to which the new processing unit is assigned.” According to Petitioner, Jain teaches that “when a new unit is added to the distributed router, the distributed router can disable or discontinue (‘deactivat[e]’) the user ports of the new unit.”

Pet. 78. Petitioner cites Jain’s disclosure regarding block 206 of Figure 2 that “a ‘Link Down’ condition is effectuated on at least a portion of the link ports of the network node” and “[w]hen the Link Down condition is sensed by the entities (i.e., devices and nodes) connected to the network node via respective links, network traffic on the links is discontinued.” Ex. 1010 ¶ 20; see Pet. 78.

Petitioner explains why and how a person of ordinary skill in the art would have been motivated to combine the teachings of Weyman and Jain. See Pet. 68–71. Petitioner asserts that Weyman teaches the addition of a new unit to its distributed router and that a new unit will need to “update its configuration to that of the distributed multicast router,” but Weyman “does not specifically explain how the new unit” would do so. *Id.* at 68 (quoting Ex. 1005 ¶ 156; citing Ex. 1005 ¶ 69). Therefore, a person of ordinary skill in the art “would have been motivated to look for ways to update the initial configuration of the newly added unit,” such as the initialization processes of Jain and LeMaire. *Id.* at 68–69. Jain in particular teaches a “controlled boot-up process” that sets a “Link Down” condition on “at least a portion of the link ports” of a network node so that network traffic on those links is “discontinued” (block 206 of Figure 2), completes an initialization process (blocks 208–210), and then sets a “Link Up” condition so that traffic can begin again (block 212). *Id.* at 69–70 (quoting Ex. 1010 ¶¶ 19–20).

Petitioner argues that an ordinarily skilled artisan would have implemented Jain’s “controlled boot-up process” in Weyman’s system to “disable or deactivate the user ports[] (the ports providing multicast streams to the network) on [a] newly added unit of Weyman’s distributed router during the initialization of the newly added unit.” Pet. 70–71. That is because Jain discloses that when a new unit is not properly initialized, “ports

[may] exhibit spurious logic conditions that may cause the interfacing entities (i.e., remote devices as well as other network nodes) to commence network traffic while the switch software (i.e., system software) is still in an incomplete operational state,” resulting in “various deleterious effects” on traffic integrity. *Id.* at 71 (quoting Ex. 1010 ¶ 19). Petitioner further contends that the fabric port of the new unit would *not* be disabled because Weyman discloses that a new unit “needs to update its configuration” when joining the fabric and a person of ordinary skill in the art “would have understood that the new unit needs to use the fabric port to synchronize the new unit’s configuration to that of the distributed router (and other units connected to the fabric link).” *Id.* at 70 n.3 (quoting Ex. 1005 ¶ 156; citing Ex. 1002 ¶ 227) (emphasis omitted). Petitioner provides the following modified version of Weyman’s Figure 11 to illustrate how it believes a person of ordinary skill in the art would have combined the references’ teachings (Reply 22).



The modified figure above shows a new unit (in yellow) added to Weyman’s distributed router, where the new unit’s user ports (shown each with a blue X) are deactivated during configuration but the fabric port (shown with

a blue square) is not disabled.¹⁴ *Id.* at 19–22. Petitioner’s contentions regarding a motivation to combine with Jain and reasonable expectation of success are supported by testimony from Dr. Houh. *See* Ex. 1002 ¶¶ 221–229.

Patent Owner makes three arguments in response, relying on the supporting testimony of Dr. Olivier. *See* PO Resp. 24–28; Sur-Reply 17–23; Ex. 2001 ¶¶ 69–79. First, Patent Owner argues that combining Jain with Weyman in the manner Petitioner asserts would be “impractical” because Jain teaches deactivating or de-energizing “all” active ports of a network node. PO Resp. 25–26 (citing Ex. 1010 ¶ 19). Therefore, Petitioner’s position that only the new unit’s link ports, not the fabric port, would be deactivated is inconsistent with Jain’s disclosure. *Id.* As support, Patent Owner points to paragraph 19 of Jain, which discloses that “[w]hen network node 102A is down for some reason, e.g., a catastrophic switch software and/or hardware failure, reset, power down, rebooting, etc., *its link port interfaces* are deactivated or de-energized, including the device-side and network-side interfaces.” Ex. 1010 ¶ 19 (emphasis added); *see* PO Resp. 25; Sur-Reply 20–21. Patent Owner contends that deactivation of all ports occurs prior to the network node being in a “system reset or power-up condition” at block 202 of Figure 2. *See* Tr. 51:8–21; Ex. 1010 ¶ 20.

¹⁴ Petitioner’s modified figure is consistent with the arguments made in the Petition, where Petitioner argued that a person of ordinary skill in the art would have been motivated to deactivate the user ports of the new unit but not the fabric port. *Compare* Pet. 69–71 & n.3, 78, *with* Reply 19–22. We also note that the modified figure shows (in green) IGMP host reports distributed over the fabric link to other units during initialization, which Petitioner asserts would be done based on the teachings of LeMaire. *See* Pet. 72–75, 79–80; Reply 21–22. We address that issue in connection with limitation [8l] below. *See infra* Section II.F.3.c.

That is not the disclosure of Jain that Petitioner relies on, however. Rather, Petitioner cites the setting of the “Link Down” condition for “at least a portion of the link ports” at block 206, described in paragraph 20 of Jain. *See* Pet. 78 (quoting Ex. 1010 ¶ 20). Thus, the relevant issue is whether setting the “Link Down” condition for a port of the network node constitutes “deactivating” the port. Petitioner argues that it does, while Patent Owner contends that Jain’s “Link Down” condition “has nothing to do with deactivating ports.” *See* Reply 23; Sur-Reply 20–21.

Petitioner’s reading is consistent with the disclosure of Jain. In Jain’s initialization process, “a ‘Link Down’ condition is effectuated on at least a portion of the link ports of the network node.” Ex. 1010 ¶ 20. Importantly, that condition is sensed by other entities connected to the network node and “network traffic on the link ports is discontinued.” *Id.* ¶¶ 7–8, 20, 24, code (57). For example, in the context of Figure 1, network node 102A may set the “Link Down” condition on link port 116-1, remote device 104A would sense that condition over link 110-1, and network traffic over link 110-1 would stop. *See id.* Link port 116-1, therefore, has been “deactivat[ed]” because network node 102A no longer transmits or receives over link port 116-1; there is no longer any communication with other devices over that port.¹⁵ Doing so achieves Jain’s stated goal of avoiding the problems associated with other devices communicating data while a device

¹⁵ Indeed, when considering the reverse—i.e., when the “Link Up” condition has been set—a port can be considered “activated” because transmission is enabled. *See* Ex. 1010 ¶¶ 7 (“Upon completion of the system software configuration, a link up condition is effectuated on the link ports, whereupon network traffic on the link ports may recommence.”), 21 (disclosing that “[u]pon sensing the Link Up condition, . . . network traffic is commenced on the links of the network node”).

“is still undergoing initialization and configuration.” *See id.* ¶¶ 6, 19–20. Indeed, Dr. Olivier agreed that “by issuing the ‘Link Down’ [condition], Jain prevents unintended network traffic with other remote devices and network nodes.” Ex. 1033, 87:10–14.

We also note that the way in which Jain effectuates the “Link Down” condition is very similar to the exemplary embodiment described in the ’394 patent. Jain discloses “maintaining an appropriate logic level on a particular pin (e.g., TX DISABLE pin) associated with a physical layer (‘PHY’) device of the network node.” Ex. 1010 ¶¶ 20, 24 (describing “a ‘transmit disabled’ state on boot-up . . . until the system software is up and running,” where “the PHY hardware in reset cannot transmit” and “the remote-side and network-side entities detect this condition as a link down condition”). The ’394 patent similarly describes disabling a port by setting a state of the port: “[w]hen a new line card is inserted into an active network element, . . . the [network processor] of the new line card *disables* its local ports 44 for a certain period of time (e.g., by setting the ADMIN_STATUS of these ports to DOWN).” Ex. 1001, col. 9, ll. 41–48 (emphasis added).

Thus, we agree with Petitioner that Jain teaches, during an initialization process, “deactivating” a portion of the ports of a new unit by effectuating a “Link Down” condition to discontinue the use of that portion of ports. *See* Pet. 70–71, 78; Ex. 1010 ¶ 20.

Second, Patent Owner argues that “there is no material difference between fabric ports and user ports” in Weyman, so the “fabric ports would experience the same issues as the active ports” and a person of ordinary skill in the art making the combination would have deactivated “all” units (i.e., user ports as well as the fabric port) of the new unit. PO Resp. 26–27 (citing Ex. 1005 ¶ 36). We disagree. Again, Jain is concerned with preventing

undesired network traffic with other, *external* devices and nodes on the network while the network node is being initialized, as such traffic can present “network problems” and “spurious logic conditions.” See Ex. 1010 ¶¶ 6, 19–20 (“[Network node 102A] engages in a controlled boot-up process, . . . such that its link ports do not exhibit spurious logic conditions that may cause *the interfacing entities (i.e., remote devices as well as other network nodes)* to commence network traffic while the switch software (i.e., system software) is still in an incomplete operational state. . . . [S]uch a situation gives rise to various deleterious effects with respect to the integrity of the traffic received at the network node.” (emphasis added)); Ex. 1033, 87:10–14; Sur-Reply 21 (acknowledging that “[d]uring the boot-up process, the ‘Link Down’ condition is effectuated on the *externally connected* link ports” (emphasis added)). We agree with Petitioner that “nothing in Jain suggests that *internal* ports—such as Weyman’s fabric ports—would present the same concerns or require deactivation.” See Reply 25–26 (emphasis added). Therefore, Petitioner’s position is not inconsistent with Weyman as Patent Owner contends.

Third, Patent Owner argues that in Petitioner’s proposed combination, IGMP messages would be communicated over the fabric link, “resulting in increased bandwidth usage in the fabric,” which “conflicts with one of the express objects of Weyman . . . to minimize bandwidth usage on the fabric links.” PO Resp. 27–28 (citing Ex. 1005 ¶ 5; Ex. 2001 ¶ 76). We disagree for similar reasons to those explained above for claims 1 and 5. See *supra* Sections II.D.3.b, II.E.2. Again, although Weyman expresses a desire to avoid “unnecessary” bandwidth usage on the fabric link, it expressly teaches that IGMP messages can be distributed to all units in the fabric for synchronization purposes. See Ex. 1005 ¶¶ 137–139, 162; Reply 27–28.

Thus, we do not see any conflict in Petitioner’s proposed combination, given Weyman’s disclosure.

Petitioner’s explanation regarding the combination of Weyman and Jain for limitation [8k], supported by the testimony of Dr. Houh, which we credit, is persuasive. See Pet. 68–71, 78; Ex. 1002 ¶¶ 221–229, 254–255. Based on the full trial record, we find that Petitioner has shown sufficiently that Weyman and Jain teach limitation [8k] and that a person of ordinary skill in the art would have been motivated to modify Weyman’s system based on the teachings of Jain.

c) Disputed Limitation [8l]

Limitation [8l] recites “while the ports to which the new processing unit is assigned are deactivated, sending a multicast status request, receiving multicast membership reports sent by multicast clients in response to the multicast status request, constructing the list by the new processing unit based on the received multicast membership reports.” Petitioner argues that “when a new unit is added to the Weyman/Jain/LeMaire[] distributed router, the distributed router disables its user ports, . . . and while the ports are disabled, the distributed router performs the initialization process.” Pet. 79 (emphasis omitted) (citing Ex. 1010 ¶ 21 (“*While the Link Down* (or, disabled) condition is maintained on the link ports, the system software of the network node continues with its initialization and configuration process until it is complete and operational.” (emphasis added))). Petitioner contends that LeMaire teaches, as part of its initialization process, “sending a multicast status request” (i.e., sending IGMP Queries to clients) and “receiving multicast membership reports sent by multicast clients in response to the multicast status request” (i.e., receiving IGMP Reports in

response, distributed over the fabric link). *Id.* at 79–80 (citing Ex. 1011, col. 9, ll. 12–19, 21–23). Finally, Petitioner relies on Weyman and LeMaire as teaching “constructing the list by the new processing unit based on the received multicast membership reports,” arguing that in Petitioner’s asserted combination, “while the ports are disabled, the new unit can use the received IGMP reports to update its forwarding table.” *Id.* at 80 (citing Ex. 1005 ¶¶ 138–139, 162; Ex. 1011, col. 9, ll. 23–34).

Addressing the full initialization process of limitations [8j]–[8m], Petitioner explains that a person of ordinary skill in the art would have been motivated to incorporate “LeMaire’s bridge initialization technique” into the combined Weyman-Jain system

such that when a new unit is added to the distributed router, the distributed router uses LeMaire’s initialization technique to update its forwarding table while the new unit’s user ports are disabled. For example, when a new unit is added to the distributed router, the distributed router can disable its user ports . . . and it can then transmit IGMP queries to its clients, as taught by LeMaire, using other units in the distributed router. In response to the IGMP queries, the other units can receive IGMP reports from the clients and forward those IGMP reports to the new unit via the fabric link and the new unit’s fabric port, as taught by LeMaire and Weyman. The new unit can then update its forwarding table in accordance with the received IGMP reports, as taught by both Weyman and LeMaire. Once such initialization process is completed, the unit activates the previously disabled user ports to initiate communication.

Pet. 73–74 (citations omitted). That functionality is depicted in green in the modified Figure 11 of Weyman above, where, although the user ports of the new unit are disabled during configuration, IGMP host reports would be distributed among the various units over the fabric link. *See supra* Section II.F.3.b.

Petitioner contends that an ordinarily skilled artisan would have been motivated to incorporate LeMaire’s teachings in that manner because, among other reasons, “Weyman teaches adding a new unit to the distributed router and teaches that initialization is needed,” but “does not provide details of such initialization process, and LeMaire provides the missing details.” Pet. 73–75. Petitioner’s contentions regarding a motivation to combine with LeMaire and reasonable expectation of success are supported by testimony from Dr. Houh. *See* Ex. 1002 ¶¶ 221–223, 230–239.

Patent Owner in its Response does not directly address limitation [8l] or Petitioner’s asserted motivation to modify Weyman and Jain based on LeMaire. In discussing limitation 8[k], though, Patent Owner argues that “Petitioner’s proposed combination . . . fails because LeMaire teaches the opposite of Jain.” PO Resp. 27 (citing Ex. 2001 ¶¶ 74–75). Patent Owner contends that unlike Jain, “LeMaire teaches that on power-up or reset, [all] ports should begin to transmit IGMP Query messages.” *Id.* (citing Ex. 1011, col. 9, ll. 12–15). Then, in its Sur-Reply, Patent Owner argues that Petitioner fails to show that LeMaire teaches “while the ports to which the new processing unit is assigned are deactivated, . . . constructing the list by the new processing unit based on the received multicast membership reports,” as recited in limitation [8l], because “LeMaire’s bridge initialization technique only operates when ports of the new processing unit are activated.” Sur-Reply 21–23 (emphasis omitted).

Patent Owner’s arguments, however, do not account for the specific combination asserted by Petitioner. Limitations [8j]–[8m] recite a three-step initialization process for a new unit. Petitioner relies on a combination with Jain for limitations [8k] (“deactivating the ports,” for which Petitioner relies on setting the “Link Down” condition in block 206 of Jain’s Figure 2) and

[8m] (“activating the ports,” for which Petitioner relies on setting the “Link Up” condition in block 212). Pet. 78, 80–81. Between those steps is the “initialization and configuration process” of Jain (blocks 208 and 210 in Figure 2). See Ex. 1010 ¶¶ 20–21. Petitioner relies on a further combination with LeMaire for the steps of limitation [8l], which must be performed “while the ports . . . are deactivated” (i.e., in between deactivating and reactivating the user ports of the new unit). See Pet. 78–80. Specifically, Petitioner’s position is that during the initialization period when the new unit’s user ports are disabled (as taught by Weyman and Jain), the new unit would “transmit IGMP queries to its clients” (as taught by LeMaire) “using other units in the distributed router.”¹⁶ *Id.* at 73; Reply 26. Patent Owner does not point to, and we do not see, anything in LeMaire indicating that the IGMP queries would need to be sent over the deactivated ports of the new unit rather than “other units” of the distributed router (via the fabric link). See Reply 26. And again, doing so would be consistent with Weyman, which discloses that IGMP messages can be “delivered to every unit in the fabric for processing.” See Ex. 1005 ¶ 162. Petitioner has provided a sufficient explanation for why and how LeMaire’s bridge initialization technique would function when incorporated into the combined Weyman-Jain system.

Petitioner’s explanation regarding the combination with LeMaire for limitation [8k], supported by the testimony of Dr. Houh, which we credit, is

¹⁶ Because the language used in the Petition and Reply is nearly identical, we disagree with Patent Owner that Petitioner made an improper “new argument [in its Reply] based on LeMaire’s teachings of transmitting IGMP queries to clients using other units in the distributed router.” See Sur-Reply 22; Pet. 73; Reply 26.

persuasive. *See* Pet. 68–69, 75–75, 78–80; Ex. 1002 ¶¶ 221–223, 230–239, 256–265. Based on the full trial record, we find that Petitioner has shown sufficiently that Weyman, Jain, and LeMaire teach limitation [8l] and that a person of ordinary skill in the art would have been motivated to modify Weyman’s system based on Jain and LeMaire.

d) Conclusion

Petitioner has shown sufficiently that Weyman, Jain, and LeMaire collectively teach all of the limitations of claim 8 and that a person of ordinary skill in the art would have been motivated to combine the references’ disclosures to arrive at the method of claim 8 with a reasonable expectation of success. *See* Pet. 68–81; Ex. 1002 ¶¶ 221–267. Based on all of the evidence of record, we determine that Petitioner has proven, by a preponderance of the evidence, that claim 8 would have been obvious based on Weyman, Jain, and LeMaire under 35 U.S.C. § 103(a).

4. Independent Claim 18

Independent claim 18 is similar to claim 8, but recites a network element rather than a method. Petitioner largely refers to its earlier arguments regarding claim 1. *See* Pet. 81–83. Patent Owner likewise refers to its earlier arguments regarding claim 8, asserting that limitation [18j] is identical to limitation [8k]. PO Resp. 28–29. We disagree with Patent Owner’s arguments for the reasons explained above. *See supra* Section II.F.3. In view of those reasons and in light of Petitioner’s arguments and supporting evidence, we are persuaded that Petitioner has proven, by a preponderance of the evidence, that claim 18 also would have been obvious

based on Weyman, Jain, and LeMaire under 35 U.S.C. § 103(a). *See* Pet. 81–83; Ex. 1002 ¶¶ 268–281.

G. Additional Obviousness Grounds Based on Weyman and Other References (Claims 2, 9, 10, 12, and 16)

Petitioner contends, under 35 U.S.C. § 103(a), that claims 2 and 12 are unpatentable over Weyman, Li, and Ding; claim 16 is unpatentable over Weyman, Li, and Pitcher; claim 9 is unpatentable over Weyman, Jain, LeMaire, and Li; and claim 10 is unpatentable over Weyman, Jain, LeMaire, and Pitcher. Pet. 65–68, 83–89. Patent Owner does not argue dependent claims 2, 9, 10, 12, and 16 separately from parent claims 1, 8, and 11. *See* PO Resp. 29. We disagree with Patent Owner’s arguments regarding parent claims 1, 8, and 11 for the reasons explained above. *See supra* Sections II.D.3–4, II.F.3. 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, 9, 10, 12, and 16 would have been obvious under 35 U.S.C. § 103(a), for the reasons stated by Petitioner. *See* Pet. 65–68, 83–89; Ex. 1002 ¶¶ 212–220, 282–299.

III. CONCLUSION¹⁷

Petitioner has demonstrated, by a preponderance of the evidence, that claims 1, 2, 4–12, and 14–18 of the '394 patent are unpatentable on the bases set forth in the following table.

In summary:

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 4, 6, 7, 11, 14, 17	103(a)	Weyman, Li	1, 4, 6, 7, 11, 14, 17	
5, 15	103(a)	Weyman, Li, Rooholamini	5, 15	
16	103(a)	Weyman, Li, Pitcher	16	
8, 18	103(a)	Weyman, Jain, LeMaire	8, 18	
9	103(a)	Weyman, Jain, LeMaire, Li	9	
10	103(a)	Weyman, Jain, LeMaire, Pitcher	10	

¹⁷ 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).

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
2, 12	103(a)	Weyman, Li, Ding	2, 12	
Overall Outcome			1, 2, 4–12, 14–18	

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1, 2, 4–12, and 14–18 of the '394 patent are 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.

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