

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

JUNIPER NETWORKS, INC.,
Petitioner,

v.

PORTSMOUTH NETWORK CORPORATION,
Patent Owner.

Case No. IPR2024-00989
Patent No. 8,014,394

**PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. §§311-319 AND 37 C.F.R. §42.1 *et seq.***

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1001	U.S. Patent No. 8,014,394 (“’394”)
1002	File History of U.S. Patent Application No. 12/369,011 (“’394FH”)
1003	Declaration of Dr. Tal Lavian (“Lavian”)
1004	CV of Dr. Tal Lavian
1005	U.S. Patent 7,983,205 (“Blease”)
1006	U.S. Patent Application Publication No. 2005/0041665 (“Weyman”)
1007	U.S. Patent 8,068,416 (“Hu”)
1008	U.S. Patent Application Publication No. 2009/0290585 (“Deng”)
1009	U.S. Patent 8,238,344 (“Chen”)
1010	Federal Judicial Caseload Statistics (2024) – District of Massachusetts
1011	Proof of Service, <i>Portsmouth Network Corp. v. Juniper Networks, Inc.</i> , 1:23-cv-12201, Dkt. No. 14 (D. Mass. Sept. 28, 2023)
1012	First Amended Complaint, <i>Portsmouth Network Corp. v. Juniper Networks, Inc.</i> , 1:23-cv-12201, Dkt. No. 61 (D. Mass. Dec. 22, 2023)
1013	First Amended Complaint – Exhibit 4, <i>Portsmouth Network Corp. v. Juniper Networks, Inc.</i> , 1:23-cv-12201, Dkt. No. 61-4 (D. Mass. Dec. 22, 2023)
1014	Kolias and Tomkos, “Switch Fabrics,” IEEE Circuits & Devices Magazine, pages 12-17 (Sept./Oct. 2005)
1015	Elhanany et al., “Switch Fabric Interfaces,” Computer, Vol. 36, Issue 9, pages 106-108 (Sept. 2003)
1016	Robert Wood, Next-Generation Network Services, Cisco Press, pages 125-131, 275-280 (2006)
1017	SysKonnect GmbH, Link Aggregation according to IEEE Standard 802.3ad, White Paper, v1.10 (Oct. 10, 2002)

Exhibit	Description
1018	IEEE Standard 802.3, Amendment to Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications – Aggregation of Multiple Link Segments (2000 Edition) (“802.3ad-Std”)
1019	<i>Request for Ex Parte Reexamination of U.S. Patent 8,014,394</i> , Control No. 90/019,441 (Mar. 5, 2024)
1020	<i>Cisco Systems, Inc. v. Portsmouth Network Corp.</i> , IPR2024-00506, Paper 2 (Mar. 31, 2024)
1021	Congdon and Subramaniam, “Why we don’t need to specify the load balancing algorithm in the Standard,” Load Balancing Algorithm, Aggregation Study Group (Feb. 4, 1998)
1022	Jeffree, “Link Aggregation Control Protocol,” Presentation to the Link Aggregation Study Group (Apr. 1998)
1023	Jeffree, Contribution to the November ‘98 Link Aggregation Meeting, Strawman/D2½: Changes/Additions to 802.3 required in order to specify Link Aggregation (Nov. 9, 1998)
1024	U.S. Patent No. 8,102,848 (“Rao”)
1025	U.S. Patent Application Publication No. 2007/0140155 (“Yu”)

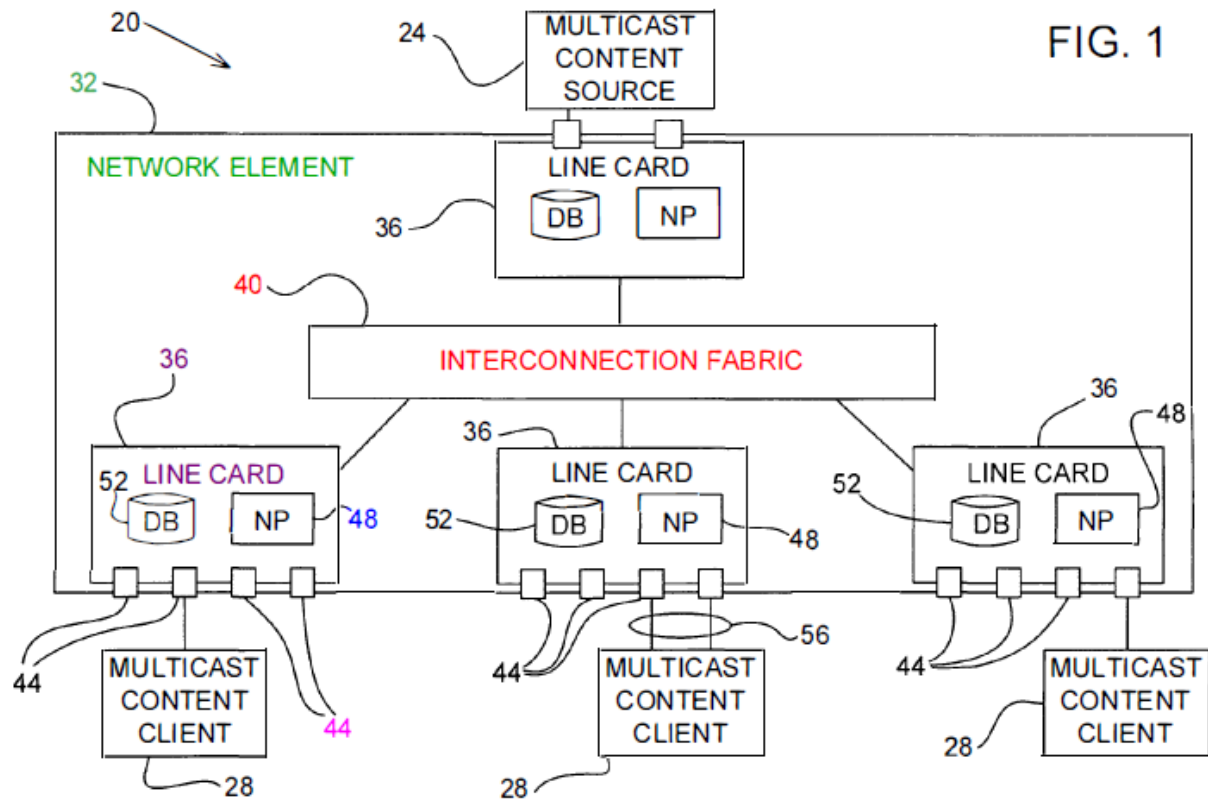
I. INTRODUCTION

Juniper Networks, Inc., requests *inter partes* review of claims 8-10 and 18 (“Challenged Claims”) of U.S. Patent No. 8,014,394 (EX1001; “’394”) in accordance with 35 U.S.C. §§311-319 and 37 C.F.R. §§42.100 *et seq.*

The ‘394 is directed to a device for managing and forwarding multicast packet streams to client devices. ’394, 4:58-62. Multicast packet communication protocols (such as IETF standards) enable a single source of content to broadcast that content over a network to multiple clients at the same time. One application of multicast communication is Internet Protocol Television (IPTV). In an IPTV environment, the ‘394 patent argues that the user experience is degraded when switching between different multicast streams (movies, television shows, etc.) is delayed by system processing time or periods of high processing demand. ’394, 4:44-57.

The ’394 patent purports to resolve IPTV switching latency via a networking element (32) that distributes multicast processing among line cards (36) of the element as illustrated by Fig. 1 below.¹ ’394, 4:58-62.

¹ In this Petition, annotations are added unless noted otherwise.



The networking element provides an interconnection switch fabric (40) for routing traffic among the line cards (36). The line cards comprise multiple ports (44) and a processor, such as a Network Processor (NP) (48), which processes the packets communicated over the ports assigned to the line card. '394, 6:23-34.

In operation, the filtering database (52) in each line card includes a list of multicast streams that are permitted for forwarding by the network element and an indication of the specific port(s) to which each is to be forwarded. The processing units construct and update their filtering databases by intercepting the multicast content requests sent by the clients (IGMP or MLD) in order to start or stop a

given stream to a client device. When the network element receives a given multicast stream from source (24), a given line card (36) forwards this stream to the designated ports only if the stream appears in its filtering database (52). Otherwise, the card discards the packets associated with the stream. '394, 7:10-26.

However, during prosecution (*see* §IV.B below), the USPTO demonstrated that a distributed multicast management architecture (managed among line cards) was well known. At filing, the independent claims recited only the database-driven connection management. Even with additional amendments, the Applicant was unable to convince the USPTO that variations on those management architectures were not already in the prior art.

Dependent claims presented in the original application recited steps related to the initialization of a network element's processing unit. '394, 9:41-53. These claims recited a process that included deactivating ports of the processing unit, requesting multicast membership statuses and updating a forwarding list in response, and activating ports of the processing unit.²

² See '394, claims 8 and 18 (10 and 28 as originally filed). Other dependent claims were indicated as reciting allowable subject matter, but those features are not recited in claims challenged here. For example, dependent claims 7 and 25 (issued

But delaying the activation of a new processing unit until it is loaded with current system data is a matter of common sense. For example, until such data is loaded, the new unit would be unable to forward packets to *correct* ports and addresses, and providing for immediate activation would lead to malfunction. Moreover, providing a delay to allow for loading of necessary switching data sets was well-known. Rao (EX2024), 9:3-10:7. Adding practical configuration procedures to the operation of a known telecommunication architecture is not an invention.

Accordingly, it is respectfully requested that *Inter Partes* Review be instituted to cancel the Challenged Claims.

II. MANDATORY NOTICES UNDER 37 C.F.R. §42.8

A. Real Party-In-Interest

Petitioner certifies that Juniper Networks Inc. is the real party-in-interest. No other party had access to or control over the present Petition, and no other party funded or participated in preparation of the present Petition.

B. Related Matters

The '394 is currently asserted in the following district court proceedings:

as claims 1 and 11 of the '394) were also allowed, and Petitioner addresses those claims in a separate petition. *See* §II.B regarding Related Matters.

Title	No.	Court	Filing Date
<i>Portsmouth Network Corporation v. Cisco Systems, Inc.</i>	2-23-cv-00441	E.D. Tex.	2023-09-26
<i>Portsmouth Network Corporation v. Juniper Networks, Inc.</i>	1-23-cv-12201	D. Mass.	2023-09-26

The '394 is currently asserted in the following USPTO proceedings:

Title	No.	Filing Date	Decision on Grant/Inst.
<i>Ex parte</i> Reexamination of U.S. Patent 8,014,394 (filed by Unified Patents, LLC)	90/019,441	2024-03-05	2024-04-19
<i>Cisco Systems, Inc. v. Portsmouth Network Corp.</i>	IPR2024-00506	2024-03-31	Pending

Petitioner is also concurrently filing a petition for *inter partes* review with respect to other claims of the '394. Petitioner recommends assigning all petitions to the same panel and consolidating the proceedings.

Title	Patent	IPR No.
<i>Juniper Networks, Inc. v. Portsmouth Network Corporation</i>	8,014,394	IPR2024-00913
		IPR2024-00989 (this Petition)

C. Lead and Back-up Counsel, and Service Information

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Petitioner consents to electronic service of documents to the email addresses of the counsel identified above.

III. REQUIREMENTS FOR IPR

A. Grounds for Standing (37 C.F.R. §42.104(a))

Petitioner certifies the '394 is available for IPR and Petitioner is not barred or estopped from requesting IPR on the following grounds.

B. Identification of Challenge (37 C.F.R. §42.104(b))

Petitioner requests IPR of the Claims and that the Board cancel the same as unpatentable.

1. Specific Art on Which the Challenge is Based

Petitioner relies upon the following prior art:

Name	Ex.	U.S. Patent / Publication No.	Effective Filing Date (at least)	Issue / Publication Date	Prior Art Under at Least Pre- AIA §102
Blease	1005	7,983,205	2005-02-28	2011-07-19	(e)
Weyman	1006	2005/0041665	2003-08-20	2005-02-24	(a)/(b)/(e)
Hu	1007	8,238,344	2007-09-20	2011-11-29	(e)
Deng	1008	2009/0290585	1999-04-14	2009-11-26	(e)
Rao	1024	8,102,848	2008-11-19	2012-01-24	(e)

2. Statutory Grounds on Which the Challenge is Based

Petitioner respectfully requests cancellation of the Claims on the following grounds:

Ground	Basis	Claims	Reference(s)
1	§103	8, 18	Blease in view of Weyman
2		9	Blease in view of Weyman and Hu
3		10	Blease in view of Weyman and Deng
4		8, 18	Blease in view of Weyman and Rao
5		9	Blease in view of Weyman, Rao, and Hu
6		10	Blease in view of Weyman, Rao, and Deng

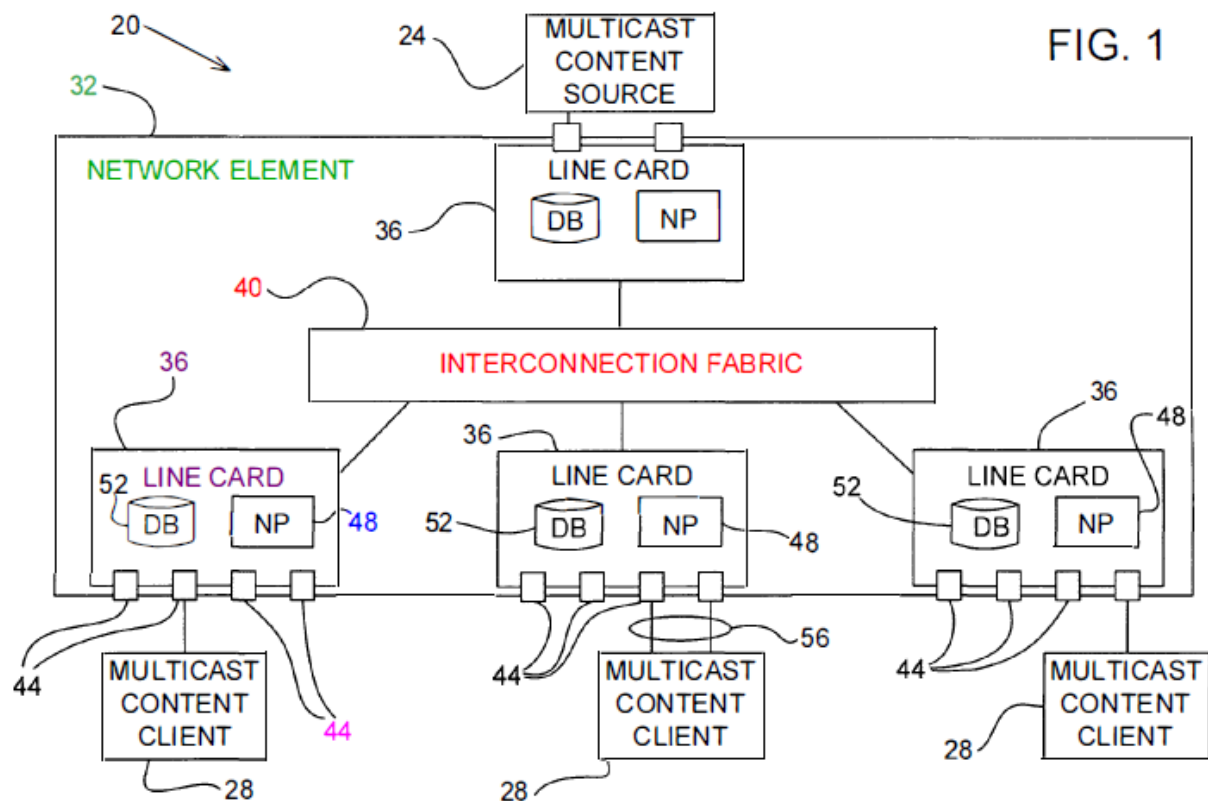
IV. BACKGROUND

A. '394 Patent

The '394 is directed to a device for managing and forwarding multicast packet streams to client devices. '394, 4:58-62. Multicast packet communication protocols (such as IETF standards) enable a single source of content to broadcast that content over a network to multiple clients at the same time. One application of

multicast communication is Internet Protocol Television (IPTV). In an IPTV environment, the '394 argues that the user experience is degraded when switching between different multicast streams (movies, television shows, etc.) is delayed by system processing time or periods of high processing demand. '394, 4:44-57.

The '394 purports to resolve IPTV switching latency via a networking element (32) that distributes multicast processing among line cards (36) of the element as illustrated by Fig. 1 below. '394, 4:58-62.



The networking element provides an interconnection switch fabric (40) for routing traffic among the line cards (36). The line cards comprise multiple ports

(44) and a processor, such as a Network Processor (NP) (48), which processes the packets communicated over the ports assigned to the line card. '394, 6:23-34.

In operation, the filtering database (52) in each line card includes a list of multicast streams that are permitted for forwarding by the network element and an indication of the specific port(s) to which each is to be forwarded. The processing units (NPs 48) construct and update their filtering databases by intercepting the multicast content requests sent by the clients (IGMP or MLD) in order to start or stop a given stream to a client device. When the network element receives a given multicast stream from source (24), a given line card (36) forwards this stream to the designated ports only if the stream appears in its filtering database (52). Otherwise, the card discards the packets associated with the stream. '394, 7:10-26.

In particular, the network element (32) may receive multicast content requests, 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). '394, 7:40-43. When using IGMP, for example, the request may comprise an IGMP membership report message or an IGMP leave message. '394, 7:44-46. The filtering database (52) in each line card may be updated by monitoring these requests. '394, 7:23-26. If the request comprises a request to receive a certain multicast stream, the NPs (48) update their filtering databases to permit forwarding of the requested multicast stream. The

permission is typically granted on a port-by-port basis. In other words, if the request arrived over a certain ingress port, then NPs (48) conclude that the multicast client that sent the request is reachable via this port. Therefore, the NPs (48) update their filtering databases to permit forwarding of the requested multicast stream to this specific port. '394, 8:9-18. Network element (32) selectively forwards incoming multicast streams in accordance with the updated filtering databases. '394, 8:25-27.

When a new line card is inserted into a network element, the new line card disables its local ports for a certain period of time while it updates its local filtering database. For example, filtering information is obtained by transmitting a multicast status update request or IGMP general query to all multicast content clients. '394, 9:41-53.

The '394 further describes that two or more ports 44 of the network element may be aggregated to form a high-capacity port 56 or Link Aggregation Group (LAG) as taught by the IEEE 802.1AX standard. '394, 6:61-67. A LAG may comprise any desired number of member ports, which may reside in the same line card or in different line cards. '394, 7:2-4. The specification describes a predetermined LAG capacity scheme as: “[t]ypically, the total number of multicast streams forwarded over the entire LAG is limited. For this purpose, the network element maintains a counter that limits the number of multicast streams that are

permitted for forwarding over the LAG.” ’394, 9:54-67. *See also* EX1003,³ ¶¶30-50.

B. Prosecution History of the ’394

The ’394 issued from U.S. Application 12/369,011 filed February 11, 2009. EX1002 (“’394FH”), 1-50. At filing, representative independent claim 1 recited a basic method for database-driven connection management, including storing lists indicating multicast packets streams and ports for forwarding those streams, receiving a client request, and forwarding packets responsive to the request and the lists. ’394FH, 30.

In the first Office Action, the Examiner rejected claims as being unpatentable over U.S. 2006/0146857 (“Naik”) in view of U.S. 2002/0191628 (“Liu”) or further in view of U.S. 2009/0290585 (EX1008; “Deng”). Dependent claims 7-8, 10, 25-26, and 28 were identified as including allowable subject matter. ’394FH, 106-131.

In response, Applicant amended independent claim 1 to further characterize the ports of the claimed network element and their use. ’394FH, 160-179.

³ Declaration of Dr. Tal Lavian (hereinafter, “Lavian”).

The Examiner maintained the claim rejections in the final Office Action, rebutted the Applicant's traversal, and again indicated that dependent claims 7, 8, 10, 25, 26, and 28 were allowable. '394FH, 186-215.

In an Amendment, Applicant rewrote four allowable dependent claims in independent form. For example, the Applicant rewrote dependent claim 10 into independent form, adding to the subject matter of independent claim 1, now canceled:

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

deactivating the ports to which the new processing unit is
assigned;

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

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

'394FH, 218-228. Dependent claim 28 was similarly rewritten into independent form. '394FH, 224-225.

The Examiner issued a Notice of Allowance on 2011-05-12. As reasons for allowance regarding claims 10 and 28, the Examiner recited the limitations relating to initializing a processing unit, identified above. '394FH, 236-240.

The '394 issued 2011-09-06. Claims 10 and 28 issued as independent claims 8 and 18 of the '394. '394FH, 244, 262. Lavian, ¶¶51-54.

V. LEVEL OF ORDINARY SKILL IN THE ART

On or before 2009-02-11, a person of ordinary skill in the art (“POSA”) would have had a bachelor’s degree in computer science, computer or electrical engineering, or a related field, and approximately two or more years of experience in computer and networking technology. Education could substitute for professional experience, and vice versa. Lavian, ¶¶77-85.

VI. CLAIM INTERPRETATION

Claim terms subject to IPR are to be construed in accordance with their ordinary and customary meaning as understood by a POSA in light of the specification and prosecution history. 37 C.F.R. §42.100(b). Only terms necessary to resolve the controversy need to be construed. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). Lavian, ¶¶86-87.

VII. GROUNDS OF UNPATENTABILITY

This Petition is supported by the Declaration of Dr. Tal Lavian, which describes the prior art's scope and content at the time of the '394. Lavian, ¶¶1-183. The prior art renders the Claims unpatentable for reasons discussed below.

A. Ground 1: Claims 8 and 18 are Obvious Over Blease in view of Weyman

1. Overview: Blease

Blease (EX1005) discloses a system and method for outgoing interface mapping for multicast traffic, including the same database-driven switch management as the '394. Blease, Abstract, 2:10-12. Blease Fig. 4 (below) shows a router 42 including interface cards ("IFCs") 54A-54N that receive packets on inbound links 55A-55N and send packets on outbound links 56A-56N. Blease, 8:39-67. Multicast forwarding information 48 controls replication and forwarding of multicast packets to subscriber devices. Blease, 10:49-61. Lavian, ¶¶56-58.

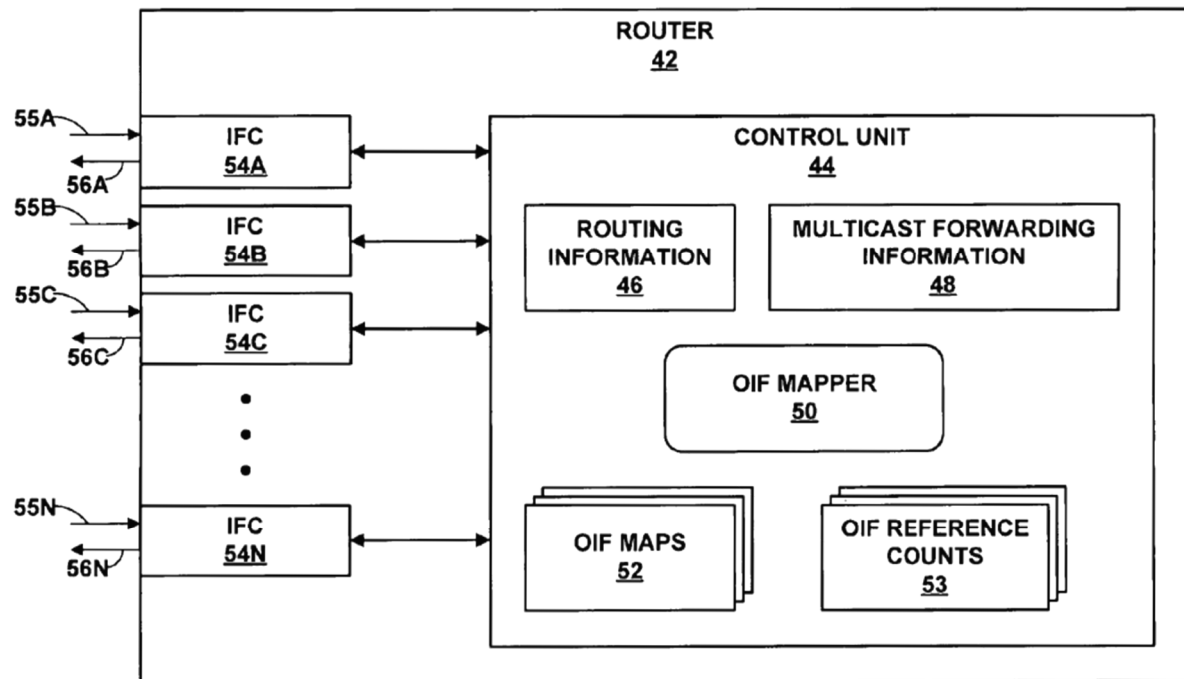


FIG. 4

Each IFC 54 includes at least one interface to receive membership requests for multicast groups and one outgoing interface (OIF) to send multicast streams associated with a multicast group to the network switch. Control unit 44 also includes an OIF mapper 50, OIF maps 52, OIF reference counts 53, and multicast forwarding information 48. Blease, 9:25-45. Lavian, ¶59.

The operation of a network device, such as router 42, is described in Figs. 6A-6B below.

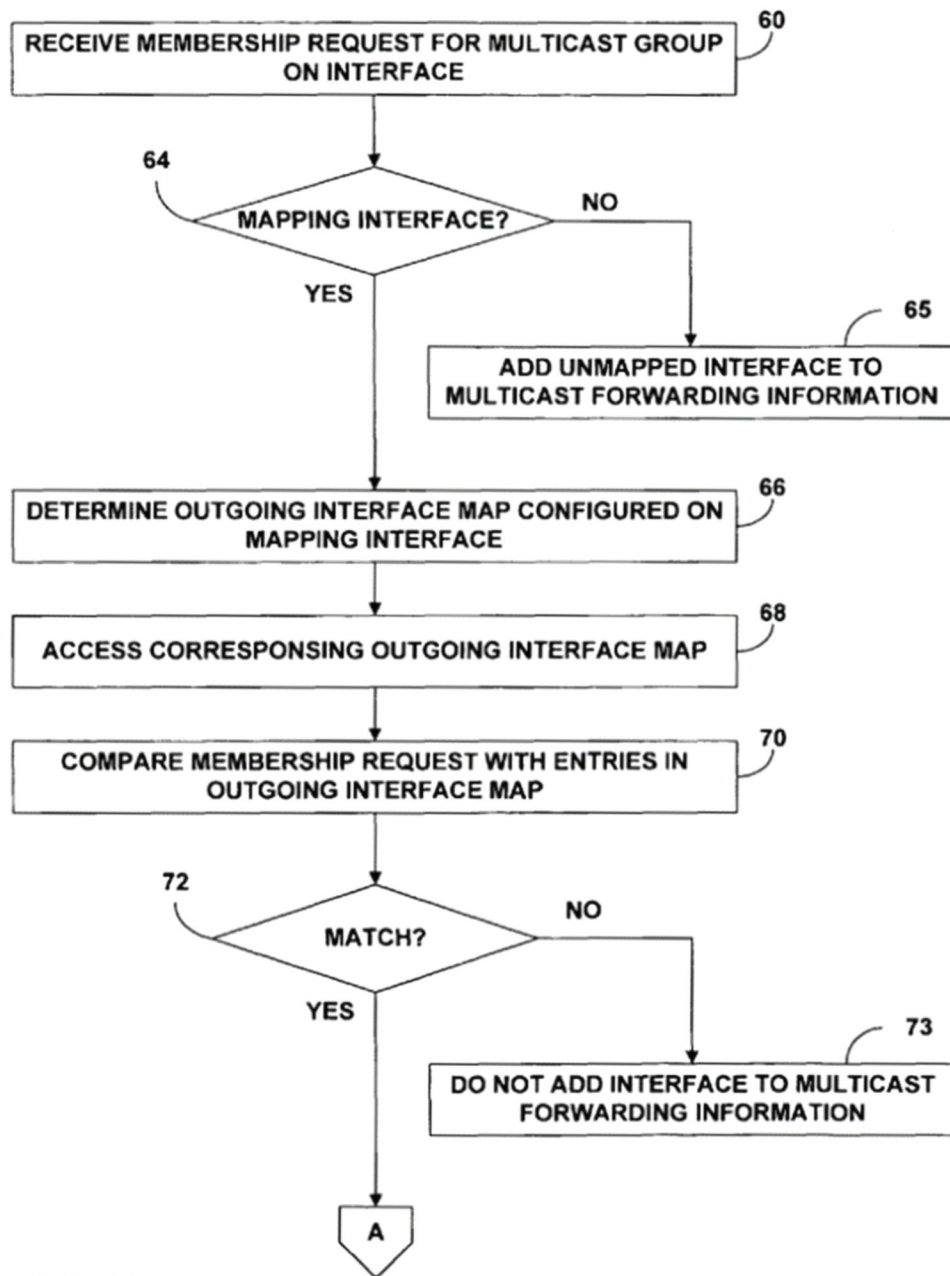


FIG. 6A

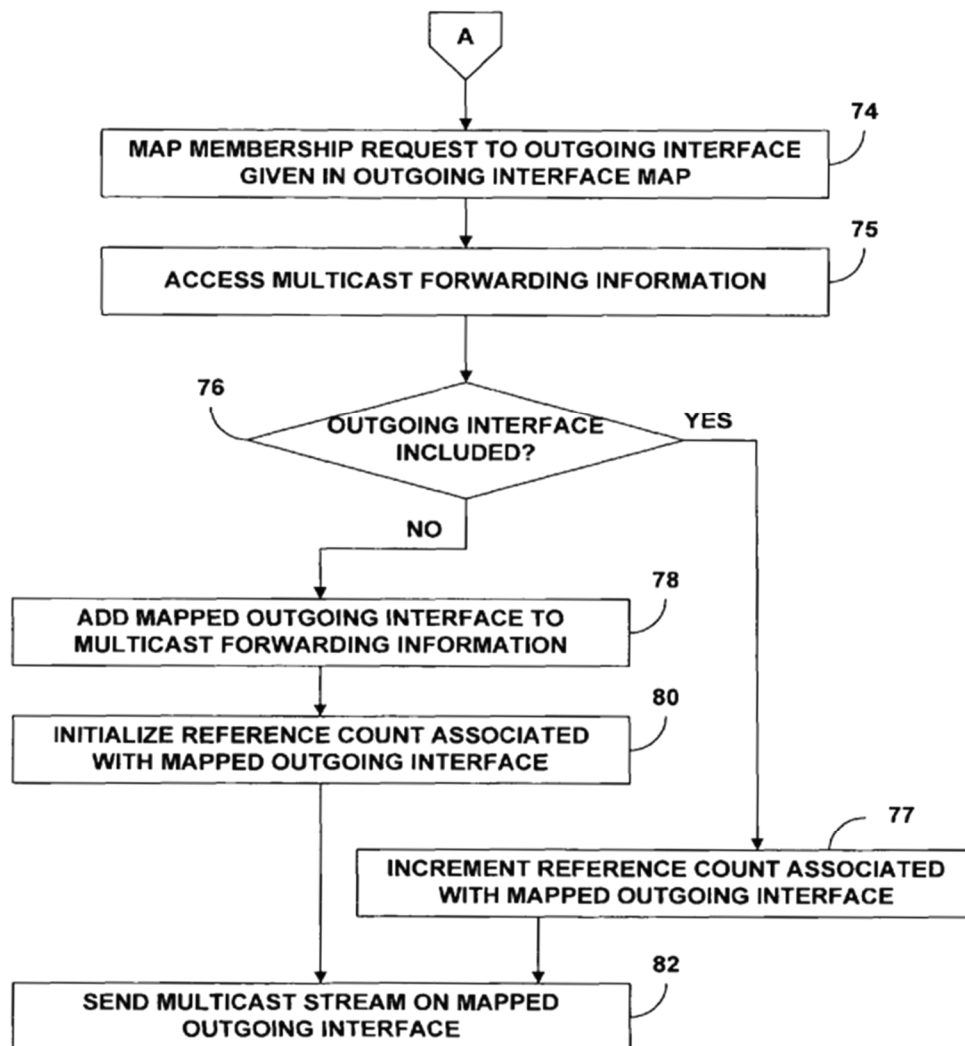


FIG. 6B

For example, at step 60, “router 42 receives a membership request for a multicast group from a subscriber device via a network switch on an interface of one of the IFCs 54.” Blease, 14:3-5. At step 64, “OIF mapper 50 determines whether the interface on which the membership request was received is configured

to use one of OIF maps 52.” Blease, 14:10-12. If not configured to use OIF maps 52, then at step 65, the OIF mapper 50 maps an unmapped interface to multicast forwarding information 48. Blease, 14:14-20. The mapped interface may be the interface that carried the membership request. Blease, 6:62-7:3, 8:29-38. Finally, at step 82, an outgoing multicast stream is transmitted on the mapped interface according to multicast forwarding information 48. Blease, 8:64-67, 10:49-52, 14:50-57. Lavian, ¶¶60-61.

Blease explains that router 42 may be configured in a variety of ways. For example, control unit 44 and its corresponding functionality may be distributed within IFCs 54. Blease, 11:54-57. That is, like the ‘394 patent, Blease describes a distributed network element configuration of line cards that enables the network element to update multicast forwarding information tables of the cards. Lavian, ¶62.

2. Overview: Weyman

Weyman (EX1006) also describes a system and method for multicast routing, including a distributed router composed of individual units. Weyman, Abstract, [0001]. Weyman Fig. 10 (below) shows one disclosed implementation of a distributed multicast router.

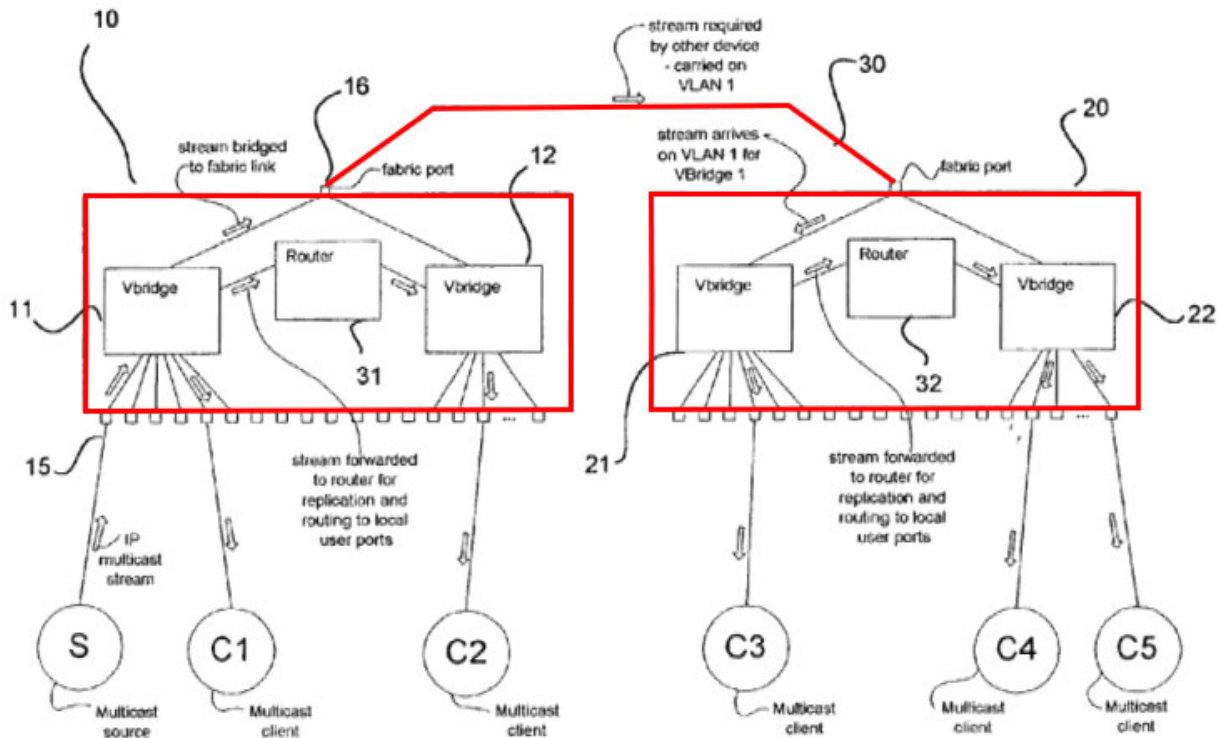


FIG.10

As highlighted above, Fig. 10 shows the “forwarding of a particular multicast stream through a distributed fabric consisting... of the two units 10 and 20 and link 30.” Weyman, [0122]. Forwarding tables, *e.g.*, within each Vbridge, include port information such as ports on which a multicast stream should be accepted and forwarded to. Weyman, [0106]-[0116]. Through various connections internal to each unit 10 and 20, and also through fabric 30 connecting unit 10 and

20, a received multicast source “S” is therefore forwarded to the various clients C1-C2 and C3-C5. Weyman, [0122]-[0124]. Lavian, ¶¶63-65.

Weyman further discloses that client units generate IGMP reports to register or change their membership in multicast groups. Weyman, [0160]-[0162]. An IGMP report received at one unit is either “delivered to every unit in the fabric for processing” or processed at one unit that “send[s] updates to the remainder of the units in the fabric.” Weyman, [0162]. Either way, “changes to the multicast distribution tree [are] kept synchronised for all units in the fabric.” Weyman, [0156], [0162]. Weyman further discloses that synchronization is also maintained for “a unit with a default configuration [that] joins the fabric” by updating the configuration of that added unit to that of the multicast router. Weyman, [0069], [0156]. Lavian, ¶66.

3. Motivation: Blease in view of Weyman

Blease and Weyman are in the same field as the ’394—*e.g.*, computer and networking technology. ’394, 1:6-8 (relating to communication networks, such as for delivering multicast traffic), Blease, 1:10-12; Weyman, [0001] (same). Lavian, ¶90.

As explained in §VII.A.1 and further in §VII.A.4 below, Blease discloses a network device, such as router 42, including a plurality of interface cards (IFCs) 54 interconnected by a control unit 44, which is configured to determine, maintain,

and use routing information to forward multicast streams to subscribers in response to subscriber requests. Blease further discloses different configurations of its system, for example distributing control unit 44 and its functionality within the plurality of IFCs 54. Blease, 4:24-27, 11:54-57. However, Blease leaves to the POSA how to implement these configurations, and Weyman teaches implementation examples for network devices delivering multicast traffic. It would have been obvious to a POSA to modify Blease with these teachings taught by Weyman and Hu for the reasons below. Lavian, ¶¶88-96.

Distributing control unit 44 (regarding, e.g., claims 8[a.i] and 8[d]): Blease discloses that control unit 44 includes information and functions including multicast forwarding information 48 and OIF mapper 50. Blease, Fig. 4, 9:43-44, 10:49-55. Control unit 44 and OIF mapper 50 update multicast forwarding information 48 based on received subscriber requests to join or leave multicast groups, and then multicast forwarding information 48 is used to forward multicast stream packets to subscribers through mapped IFC interfaces identified therein. Blease, 8:53-67, 10:49-55, 14:50-57. While Fig. 4 of Blease illustrates control unit 44 as a central component of router 42 that is separate from the plurality of IFCs 54, router 42 may also be configured in a “variety of ways,” for example where “control unit 44 and its corresponding functionality may be distributed within IFCs 54.” Blease, 11:54-57. Lavian, ¶91.

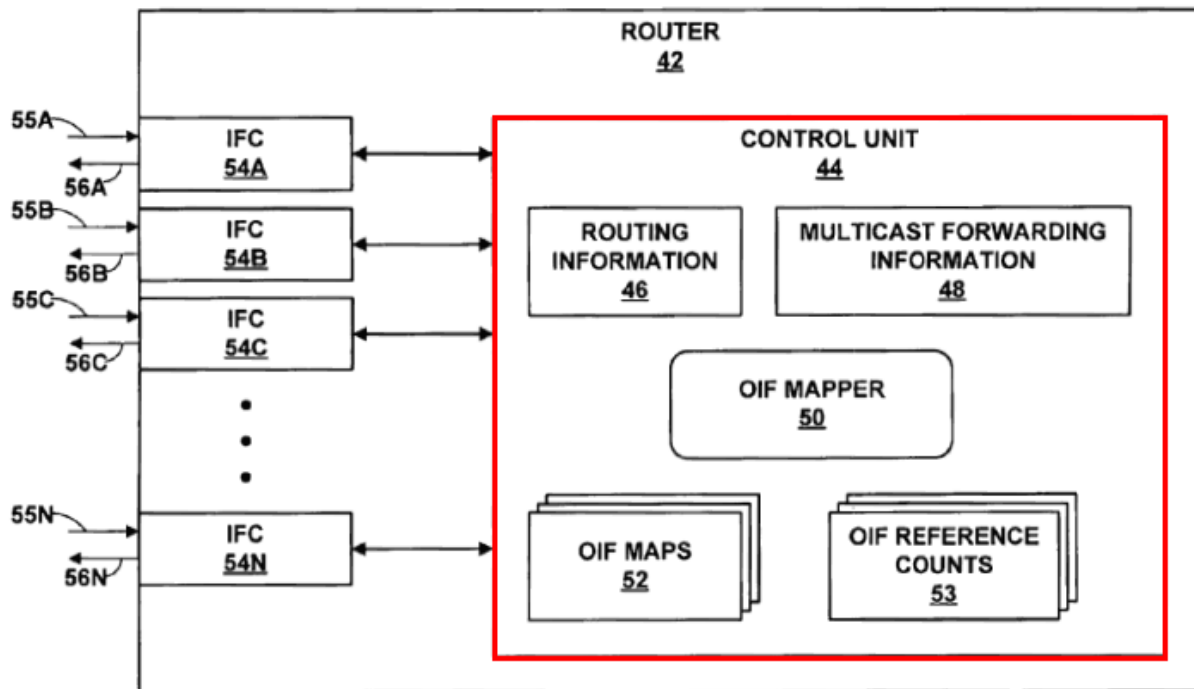


FIG. 4

However, Blease leaves implementation details to the POSA regarding how such distribution of control unit 44 and its functionality would be carried out, for example whether to interconnect the distributed control units 44 (with respect to claim 8[a.i]) and how and what information to pass between the distributed control units 44 when analyzing received requests (with respect to claim 8[d]). Lavian, ¶91.

As discussed above, Weyman teaches exemplary configurations of routers with a plurality of network units for symmetrical operation. In such configurations, Weyman teaches that the network units are interconnected by a fabric link, and IGMP reports (*e.g.*, requests received from clients to change their multicast group

membership) are either “delivered to every unit in the fabric for processing” or processed by one unit that “send[s] updates to the remainder of the units in the fabric.” Weyman, [0024], [0122], [0159]-[0162]. Lavian, ¶92. Blease does not provide explicit details regarding how to implement its distributed control unit, so a POSA would have been motivated to look to other known systems, like Weyman, for implementation. Thus, in view of Weyman, a POSA would have implemented Blease's control unit and functionality in each of the IFCs, connected the IFCs (*e.g.*, through a fabric), and synchronized their multicast distribution information (*e.g.*, in response to IGMP reports). Systems configured as a plurality of units connected via a fabric take advantage of several beneficial abilities, such as appearing to other entities as a single entity, sharing of workloads between units, gaining data forwarding performance, and minimizing dependence on any one unit within the fabric. Weyman, [0024]. Furthermore, by distributing Blease's control units and synchronizing multicast distribution information across all units in the fabric, the system benefits from redundancy and is better able to recover if any one component fails. Weyman, [0052], [0072]-[0075], [0086], [0093], [0162]. Lavian, ¶95.

Furthermore, the above modification would have been, at least, the application of known techniques (*e.g.*, Weyman's teaching of distributed multicasting including a fabric and functions of distributing requests and/or request

analysis results) to a known system teaching this very implementation (*e.g.*, Blease's network device disclosed as being configurable with distributed a control unit but lacking *explicit* details) to yield predictable results (*e.g.*, operating control units at each of Blease's IFCs and processing requests received among the IFCs). *See* MPEP §2143 (citing *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 415-421 (2007)).

Initializing a new processing unit (regarding, *e.g.*, claim 8[f]): Blease in view of Weyman discloses a network device 4 (of which router 42 is an example) including a plurality of processing units, including IFCs 54A through 54N, as discussed above. Blease, Fig. 4. And, as discussed above, Blease leaves implementation details to the POSA regarding how the distribution of control unit 44 and its functionality would be carried, which is taught by Weyman. Lavian, ¶91.

Weyman teaches further aspects of implementing distributed multicast routing, including the addition of new processing units to an interconnected fabric. In particular, Weyman teaches that for systems that accommodate the addition and removal of units, it is beneficial to update the configuration of an added unit so that the router configuration on all units of a fabric are identical and the multicast router may continue to operate as a single distributed multicast router. Weyman, [0069], [0156]. Weyman teaches at least one method for determining the multicast memberships of a distributed router. For example, Weyman explains that the

“exchange of query and report messages” includes “[q]uery messages [that] are sent by IP multicast routers to determine the group membership of clients on an attached sub-network,” and Weyman further explains that memberships reported in response affect, and are thus reflected by, the multicast distribution tree that is kept updated. Weyman, [0161]-[0162]. *See also* Yu (EX2025), [0053], [0059] (sending multicast query messages to multicast clients to correctly obtain their status). Lavian, ¶93.

Weyman, however, does not explain procedural details for updating the configuration of a unit, as claimed in the ’394, leaving that to the knowledge of a POSA. For example, a POSA would have recognized that a new unit (and its ports) would be deactivated and not be activated until it has had a chance to create and/or update its forwarding tables with the current state of multicast memberships. As Weyman explains, a newly added unit may have a “default configuration.” Weyman, [0069]. It would not be reasonable to a POSA to use a component’s default configuration, which may have been set at manufacture or set in a prior installation and contain information that is likely irrelevant or, worse, that conflicts with the other processing units of the router. Lavian, ¶94. *See B/E Aerospace, Inc. v. C&D Zodiac, Inc.*, 962 F.3d 1373, 1380 (Fed. Cir. 2020) (“common sense serves a critical role in determining obviousness” and “has long been recognized to inform the analysis of obviousness if explained with sufficient reasoning”).

Accordingly, a POSA would have been motivated to operate Blease's router to accommodate the addition of a processing unit (*e.g.*, an additional IFC 54) by deactivating the ports of the additional processing unit, sending a multicast or IGMP group membership query to determine client memberships in the network, updating the additional processing unit's multicast distribution tree information (*e.g.*, multicast forwarding information 48), and then activating the ports of the additional processing unit to process packets according to the updated multicast information. As processing units may at times become "disabled" or "go[] down for any reason," the ability to add and remove processing units facilitates the replacement of those processing units with working processing units. Blease, 11:34-45. Lavian, ¶95.

A POSA would have had a reasonable expectation of success modifying Blease's system to include control units 44 at each IFC 54 and to interconnect them via a fabric, and to accommodate an additional processing unit or IFC 54 by disabling the processing unit ports, updating its multicast forwarding information, and then activating the processing unit ports, as taught by Weyman. Indeed, Blease discloses that its router 42 may be configured in a variety of ways and specifically suggests distributing control unit 44 to IFCs 54, and that activating and deactivating interfaces and updating multicast forwarding information were known router functions. Blease, 11:34-45, 11:53-57. The modifications to Blease merely

require techniques well-known to, and within the ordinary skill of, POSAs, such as the use of a “fabric” (many of which were well-known in the art; *see* Weyman, [0002]). Lavian, ¶¶31-42, 96.

Claims 8 and 18 are therefore obvious over Blease in view of Weyman. Lavian, ¶¶88-140.

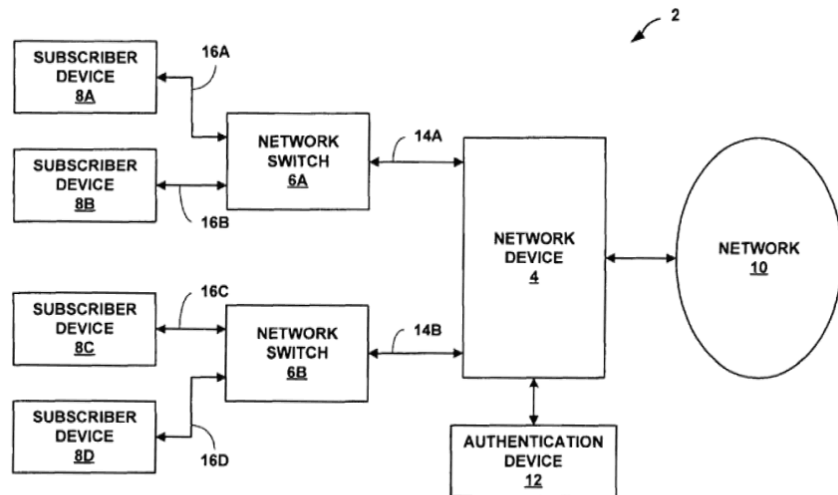
4. Claim Charts

'394	Blease (EX1005), Weyman (EX1006)
8[pre⁴]. A method for communication, comprising:	Blease discloses a method for communication (<i>e.g.</i> , communicating traffic between a network, network devices, and subscriber devices). Lavian, ¶¶98-102. Blease discloses a system and method for providing subscriber devices 8/20/34 with traffic from a network 10 through a network device 4/24/38. Blease, Figs. 1-3, 3:34-58. Traffic includes, <i>e.g.</i> , multicast traffic such as Internet Protocol Television (IPTV). Blease, 3:53-55. Lavian, ¶¶99-101. <i>E.g.</i> , Blease: • Fig. 1

⁴ The prior art discloses the preambles of the '394 claims, regardless of whether they are limiting.

'394

Blease (EX1005), Weyman (EX1006)



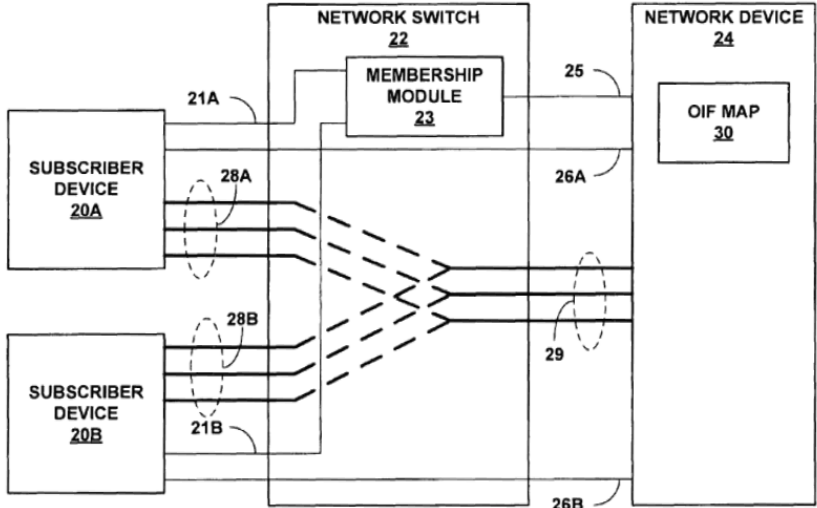
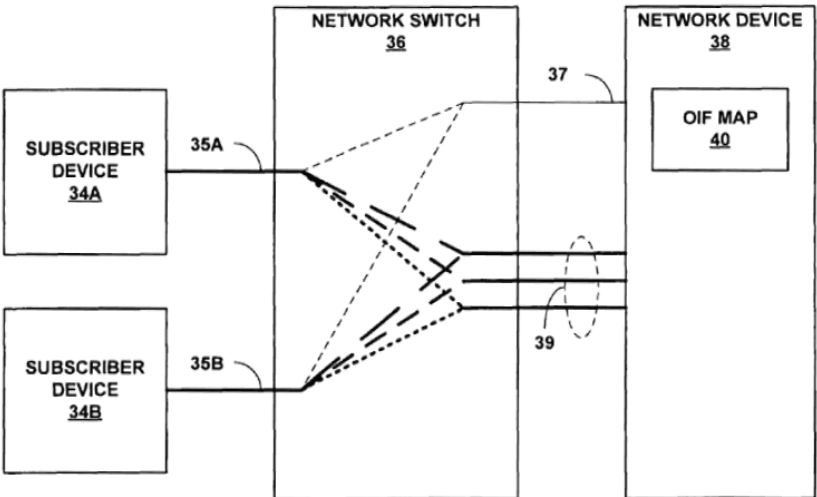
7 FIG. 1

- 3:34-58 (“FIG. 1... illustrating... a network device 4 provides subscriber devices 8A-8D (“subscriber devices 8”) with connectivity to a network 10. Network 10 represents any computer network....

As illustrated, subscriber devices 8A and 8B connect to network device 4 via network switch 6A and subscriber devices 8C and 8D connect to network device 4 via network switch 6B. Subscriber devices 8 may comprise personal computers..., or other devices. In other embodiments, any number of network switches may connect to network device 4 and any number of subscriber devices may connect to each of the network switches.

Network device 4 is capable of providing subscriber devices 8 with multicast traffic, e.g., Internet Protocol television (IPTV), from network 10. Subscriber devices 8 request multicast streams, e.g., IPTV channels, by sending a membership request for a specific multicast group to network device 4.”)

- Fig. 2

'394	Blease (EX1005), Weyman (EX1006)
	 FIG. 2 • Fig. 3  FIG. 3 • See also 3:34-4:64, 4:65-7:3, 7:4-8:38.
8[a.i]. operating a network element, wherein the	Blease discloses operating a network element (<i>e.g.</i> , operating router 42 to provide subscriber devices access to a network), wherein the network element further comprises multiple interconnected processing units (<i>e.g.</i> , router 42

'394	Blease (EX1005), Weyman (EX1006)
network element further comprises multiple interconnected processing units and multiple ports,	includes multiple interconnected interface cards (“IFCs”) 54A-54N) and multiple ports (<i>e.g.</i>, router 42 includes multiple virtual interfaces, mapping interfaces, outgoing interfaces (OIFs), inbound links 55A-55N, and outbound links 56A-56N). Lavian, ¶¶103-109. Regarding ports: Blease discloses that router 42, which is an example of network device 4/24/38 shown in Figs. 1-3 (<i>see</i> claim 8[pre]), includes multiple ports forming interfaces—physical or virtual—for receiving requests and sending streams. Blease, 1:28-33, 3:65-4:9, 8:39-52, 10:6-13; <i>see also</i> Chen, 1:5-27, 5:47-62 (network devices for receiving and forwarding multicast data connect with subscribers over “links” including one or more “ports”); Hu, 3:19-26. For example, each IFC 54 shown in Fig. 4 includes, at least, an interface to receive membership requests for multicast groups and an outgoing interface (OIF) to send multicast streams associated with a specific multicast group. Blease, 9:25-42. These interfaces of the IFCs 54 are shown as inbound links 55A-55N and outbound links 56A-56N in Fig. 4. Blease, 8:53-67. Lavian, ¶¶104-106. Regarding multiple interconnected processing units: Blease discloses operating router 42 to “provide subscriber devices access to a network.” Blease, 8:39-52. Router 42 includes multiple IFCs 54, which receive requests and forward multicast packet streams according to information from control unit 44. Blease, Fig. 4, 8:39-67, 10:6-13. From these disclosures, a POSA would have recognized that IFCs 54 are processing units including processors because receiving, forwarding, and transmitting packet information requires processors to interpret and format information appropriately for understanding by other devices (<i>e.g.</i>, control unit 44, network switches, subscriber devices). Blease, 11:63-67. <i>See</i> Chen, 4:20-56 (packet forwarding engine including a processor to perform routing functions and handle packet transfers to/from a port and switch fabric).

'394	Blease (EX1005), Weyman (EX1006)
	Lavian, ¶107. Blease further discloses that control unit 44 and its functionality is distributed within IFCs 54. Blease, 11:54-57. Accordingly, each IFC 54 includes control unit 44 and is a processing unit. Furthermore, to the extent PO argues that IFCs 54 would not necessarily be interconnected, it would have been obvious to a POSA to connect them. As discussed in §VII.A.3, a POSA would have been motivated to implement Blease's disclosure of distributed control based on Weyman's teachings, wherein distributed control units for processing multicast traffic are interconnected by a fabric link for communication and are kept synchronized. <i>See, e.g.</i>, Weyman, Fig. 10, [0122] (router "forwarding... a particular multicast stream through a distributed fabric" including "two units 10 and 20 and link 30"), [0162] ("changes to the multicast distribution tree must be kept synchronised for all the units in the fabric"). Accordingly, Blease in view of Weyman further discloses multiple interconnected processing units. Lavian, ¶¶107-108. <i>E.g.</i>, Blease: • 1:28-33 ("The term "link" is often used to refer to the connection between two devices on a network. The link may be a physical connection... or a wireless connection. In addition, network devices may define "virtual" or "logical" links, and map the virtual links to the physical links.") • Fig. 4

'394

Blease (EX1005), Weyman (EX1006)

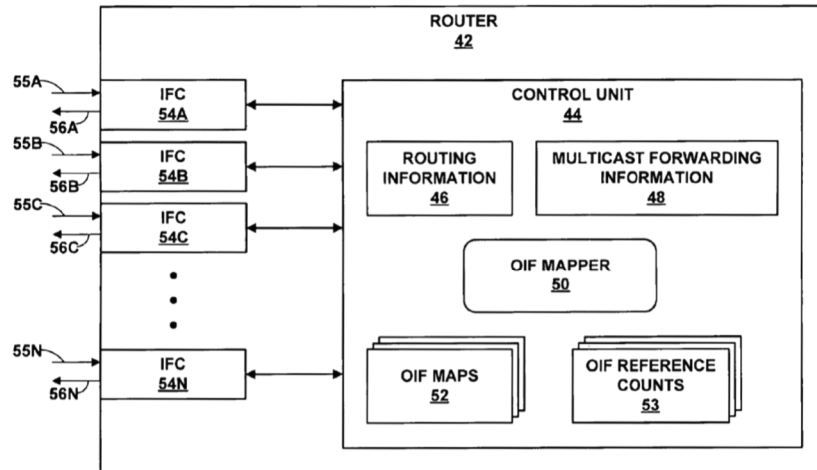


FIG. 4

- 3:65-4:4 (“The multicast transmission techniques... allow network device 4 to receive a membership request for a multicast group on a first interface, i.e., a mapping interface, and send a multicast stream associated with the multicast group on a second interface, i.e., an outgoing interface (OIF). The first and second interfaces may comprise either physical interfaces or virtual interfaces.”)
- 8:39-52 (“FIG. 4... illustrating an exemplary router 42.... Router 42 may operate substantially similar to network device 4 in FIG. 1, network device 24 in FIG. 2, or network device 38 in FIG. 3. Router 42 may provide subscriber devices access to a network, e.g., network 10 from FIG. 1.... In general, router 42 is capable of receiving membership requests for multicast groups on a first interface and sending multicast streams associated with the multicast groups on a second interface that may be dedicated to a network switch servicing the subscriber devices from which the requests may be received.”)
- 8:53-67 (“[R]outer 42 includes interface cards 54A-54N (“IFCs 54”) that receive packets on inbound links 55A-55N (“inbound links 55”) and send packets on outbound

'394	Blease (EX1005), Weyman (EX1006)
	<u>links 56A-56N (“outbound links 56”). Router 42 also includes a control unit 44 that maintains routing information 46 to reflect the current topology of a network and other network entities to which router 42 is connected. In general, when router 42 receives a unicast packet via one of inbound links 55, control unit 44 determines a destination for the packet in accordance with routing information 46 and outputs the packet on one of outbound links 56 based on the destination. When router 42 receives a multicast packet via one of inbound links 55, control unit 44 forwards the packet on a set of outbound links 56 in accordance with multicast forwarding information 48.”)</u> • 9:25-42 (“<u>Each of IFCs 54 may include a plurality of interfaces, e.g., virtual connections, to network switches and/or subscriber devices. The virtual connections may comprise ATM PVCs or Ethernet VLANs depending on the type of shared access network over which router 42 connects to the network switches. More specifically, each of IFCs 54 may include at least one mapping interface to receive membership requests for multicast groups. Subscriber devices may, for example, send the membership requests to a network switch over a different interface. The network switch may aggregate and forward the membership requests onto the mapping interface that connects to router 42. Each of IFCs 54 may also include at least one OIF to send multicast streams associated with a specific multicast group to the network switch. Each of the OIFs may be dedicated to a multicast group requested by the subscriber devices. The network switch is then responsible for replicating and forwarding the multicast streams from the dedicated OIFs to the requesting subscriber devices.”)</u>”) • 10:6-13 (“<u>[R]outer 42 receives a membership request for a multicast group from a subscriber device via a network switch on an interface of one of IFCs 54. The subscriber device may use the IGMP to signal the</u>”)

'394	Blease (EX1005), Weyman (EX1006)
	membership request to router 42. In the case of an IPv6 network, the subscriber device may use the MLD protocol to signal a membership request to router 42. <u>The one of IFCs 54 forwards the received membership request to control unit 44.</u>") • 11:54-57 (“[R]outer 42 may be configured in a variety of ways. In one embodiment, for example, <u>control unit 44 and its corresponding functionality may be distributed within IFCs 54.</u>”) • <i>See also</i> 2:15-22.
8[a.ii]. wherein each processing unit is assigned to a different subset of the multiple ports of the network element, and 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;	Blease discloses that each processing unit is assigned to a different subset of the multiple ports of the network element (e.g., each IFC 54 is assigned different inbound links 55A-55N and outbound link 56A-56N), and each processing unit contains a processor for processing packets (e.g., each IFC 54 includes a processor for processing information received and sent as packets) communicated over the different subset of the multiple ports to which the processing unit is assigned (e.g., requests are received on inbound links 55A-55N, streams are sent over outbound links 56A-56N as determined by control unit 44). Lavian, ¶¶110-112. As discussed for claim 8[a.i], Blease discloses that each IFC 54 includes inbound links 55A-55N and outbound links 56A-56N, comprising ports of the router 42. Blease, 8:53-67, 9:25-42. As shown in Fig. 4, each IFC is assigned a different subset of the links. Lavian, ¶111. Also discussed for claim 8[a.i], Blease alone or in view of Weyman discloses that each IFC includes a processor for processing packets that are received or for forwarding. For example, control unit 44 forwards packets based on multicast forwarding information 48. Blease, 8:53-67. Lavian, ¶112. As shown in Fig. 4, the packets are communicated over the different subset of links assigned to each IFC 54. For example, IFC 54A is configured to communicate packets over inbound link 55A and outbound link 56A, while IFC

'394	Blease (EX1005), Weyman (EX1006)
	54C is configured to communicate packets over inbound link 55C and outbound link 56C. Blease, Fig. 4. Lavian, ¶¶111-112. <i>E.g.</i>, Blease: Fig. 4, 8:39-52, 8:53-67, 9:25-42, 10:6-13 (<i>see</i> claim 8[a.i]).
8[b]. 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;	Blease discloses storing in each processing unit a respective list (<i>e.g.</i>, control unit 44 includes OIF mapper 50 that uses and/or maintains mapping information including multicast forwarding information 48; control unit 44 and its functionality, including multicast forwarding information 48, is distributed amongst IFCs 54), each list indicating all of one or more multicast packet streams that are permitted for forwarding by the network element (<i>e.g.</i>, multicast forwarding information 48 indicates the multicast streams currently forwarded to a network switch and to subscribers), and further indicating which of the one or more ports each multicast packet stream is permitted to be forwarded to (<i>e.g.</i>, multicast forwarding information 48 indicates which OIFs are used to stream a multicast stream). Lavian, ¶¶113-116. Blease discloses that control unit 44 includes OIF mapper 50, OIF maps 52, and multicast forwarding information 48. Blease, Fig. 4, 9:43-44, 10:49-61. Entries in multicast forwarding information 48 indicate the multicast streams that router 42 is forwarding to subscribers based on received requests. Blease, 10:49-61. Multicast forwarding information 48 further includes mapped OIF information that indicates which OIF is used to stream the multicast stream. Blease, 8:64-67, 10:49-52, 14:50-57; <i>see also</i> 11:5-17, 11:34-51 (describing addition/removal of a mapped OIF from multicast forwarding information 48 when, <i>e.g.</i>, an OIF becomes active/disabled). Multicast forwarding information 48, including individual readable entries describing multicast packet streams and related forwarding information, is therefore a list of that information. Lavian, ¶¶114-115; <i>see</i>

'394	Blease (EX1005), Weyman (EX1006)
	<i>also</i> Blease, 6:62-63, 8:29-30. As discussed for claim 8[a.i] and in §VII.A.3, Blease alone and in view of Weyman discloses that control unit 44 and its functionality is distributed within IFCs 54, and multicast distribution information—<i>i.e.</i>, routing and forwarding information—is kept synchronized. Accordingly, multicast forwarding information 48 is stored in each IFC 54. Lavian, ¶114. <i>E.g.</i>, Blease: • 8:64-67 (“When router 42 receives a multicast packet via one of inbound links 55, <u>control unit 44 forwards the packet on a set of outbound links 56 in accordance with multicast forwarding information 48.</u>”) • 9:43-44 (“<u>Control unit 44 also includes an OIF mapper 50, OIF maps 52, and OIF reference counts 53.</u>”) • 10:49-61 (“OIF mapper 50 then accesses multicast forwarding information 48. <u>Multicast forwarding information 48 controls replication and forwarding of multicast packets to subscriber devices.</u> Control unit 44 updates multicast forwarding information 48 based on messages received from the subscriber devices that indicate a desire to join or leave multicast groups, <i>i.e.</i>, to receive or stop receiving multicast streams. In response to a join request, OIF mapper 50 determines <u>whether multicast forwarding information 48 indicates that the multicast stream associated with the requested multicast group is currently forwarded to the network switch,</u> <i>i.e.</i>, whether another subscriber device connected to the same network switch is currently receiving the requested multicast stream.”) • 14:50-57 (“<u>OIF mapper 50 then pushes the multicast stream to the network switch over the mapped OIF (82).</u> If the multicast stream is already forwarded to the network switch (yes branch of 76), the entry in multicast forwarding information 48 remains

'394	Blease (EX1005), Weyman (EX1006)
	unchanged. OIF mapper 50 increments the one of OIF reference counts 53 associated with the mapped OIF (77). <u>Router 42 continues to send the multicast stream down the mapped OIF (82).</u>") • 11:54-57 (<i>see</i> claim 8[a.i]) • <i>See also</i> 11:5-17, 11:34-51.
8[c]. receiving from a client a request relating to reception of a given multicast packet stream;	Blease discloses receiving from a client a request relating to reception of a given multicast packet stream (<i>e.g.</i>, receiving a membership request relating to reception of an IPTV channel that a subscriber wants to receive). Lavian, ¶¶117-119. Blease discloses receiving, at an IFC 54 from a subscriber device, a membership request for a multicast group so that the subscriber can receive content such as an IPTV channel. Blease, 9:14-24, 10:6-12, 14:3-5. Multicast content is communicated as multicast packet streams. Blease, 3:53-58, 8:53-67. Lavian, ¶118. <i>E.g.</i>, Blease: • 3:53-58 ("<u>Network device 4 is capable of providing subscriber devices 8 with multicast traffic, e.g., Internet Protocol television (IPTV), from network 10. Subscriber devices 8 request multicast streams, e.g., IPTV channels, by sending a membership request for a specific multicast group to network device 4.</u>") • 8:53-67 ("In the illustrated embodiment, router 42 includes interface cards 54A-54N ("IFCs 54") that receive packets on inbound links 55A-55N ("inbound links 55") and <u>send packets on outbound links 56A-56N ("outbound links 56")</u>.... When router 42 receives a <u>multicast packet</u> via one of inbound links 55, control unit 44 forwards the <u>packet</u> on a set of outbound links 56 in accordance with multicast forwarding information 48.") • 9:14-24 ("<u>For example, the subscriber device may comprise a set-top box for IPTV. In that case, the</u>

'394	Blease (EX1005), Weyman (EX1006)
	<u>requested multicast group or source-group comprises an IPTV channel that a subscriber wants to receive.... If the subscriber device is not authorized to receive the requested multicast grou[p] or source-group, router 42 may ignore the membership request.”)</u> • 10:6-12 (“In accordance with the invention, <u>router 42 receives a membership request for a multicast group from a subscriber device via a network switch on an interface of one of IFCs 54</u>. The subscriber device may use the IGMP to signal the membership request to router 42.... The one of IFCs 54 forwards the received membership request to control unit 44.”) • 14:3-5 (“<u>router 42 receives a membership request for a multicast group from a subscriber device via a network switch on an interface of one of IFCs 54</u> (60).”) • <i>See also</i> 1:48-61, 14:5-9, Fig. 6A (step 60).
8[d]. distributing the request among the multiple processing units within the network element, and updating the respective list in each processing unit responsively to the request; and	Blease in view of Weyman discloses distributing the request among the multiple processing units within the network element (<i>e.g.</i>, forwarding the request to control units 44 distributed across IFCs 54, which determines multicast forwarding information 48 to be updated at each IFC 54), and updating the respective list in each processing unit responsively to the request (<i>e.g.</i>, the multicast forwarding information 48 is updated to include the identity of the interface that received the request). Lavian, ¶¶120-129. Blease discloses receiving the request at an IFC 54, as discussed for claim 8[c]. The request is then forwarded to control unit 44. Blease, 10:12-13. As discussed for claims 8[a.i] and 8[b], and in §VII.A.3, Blease alone and in view of Weyman discloses that control unit 44 and its functionality is distributed within IFCs 54, and multicast distribution information—<i>i.e.</i>, routing and forwarding information—is kept synchronized. To process a request, for example,

'394	Blease (EX1005), Weyman (EX1006)
	Weyman explains that “one unit... process[es] the IGMP report [<i>i.e.</i>, the request⁵] and... send[s] updates to the remainder of the units in the fabric” or “the IGMP message could be delivered to every unit in the fabric for processing.” Weyman, [0162]. Lavian, ¶121. That is, a POSA would have configured IFCs 54 in one of at least two ways taught by Weyman. Either (1) the request is distributed to each control unit 44 in each IFC 54 for processing, or (2) the request is processed by the control unit 44 of the IFC 54 that received the request, and result are distributed accordingly. Both configurations would have disclosed and/or rendered obvious limitation 8[d]. Lavian, ¶122. (1) Request is distributed to each control unit for processing. In a configuration where the received request is forwarded to each control unit 44 for processing, each control unit 44 of each IFC 54 will analyze the request and update its own stored multicast forwarding information 48. For example, control unit 44 includes OIF mapper 50. Blease, Fig. 4. OIF mapper 50 analyzes the request and, in some cases, decides that the interface on which the request is received will be the interface used to forward the requested multicast to the subscriber (“similar to conventional transmission techniques”) and updates multicast forwarding information 48 accordingly. Blease, 6:62-7:3, 14:10-20. Lavian, ¶¶123-125. (2) Request is processed at one IFC and results are distributed to other IFCs. As discussed just above, OIF mapper 50 analyzes requests and, in some cases, decides that the interface on which the request is received will be the interface used to forward the requested multicast to the subscriber and updates multicast

⁵ See also the Blease at 5:38-50, describing the processing of IGMP requests.

'394	Blease (EX1005), Weyman (EX1006)
	forwarding information 48 accordingly. In a configuration where the request is processed by the control unit 44 of the receiving IFC 54 and then its results forwarded to update each other IFC 54's multicast forwarding information 48, the process of forwarding results for updating multicast forwarding information 48 is “distributing the request among the multiple processing units within the network element and updating the respective list in each processing unit responsively to the request” as claimed. Lavian, ¶126. In particular, because OIF mapper 50 of the control unit 44 learns, from the request, the identity of the interface that received the request—such that OIF mapper 50 then updates multicast forwarding information 48 in each other IFC 54 with the identity of the interface that received the request, Blease in view of Weyman therefore discloses distributing the request among the multiple processing units within the network element and updating the respective list in each processing unit responsively to the request. Lavian, ¶¶127-128. As detailed by dependent claim 4 of the '394, the claimed distributing and updating may be defined as distributing the identity of an ingress port that is added to the list: “distributing the request comprises <u>distributing... an identity of an ingress port over which the request was received</u> at the network element” and “updating the list comprises <u>causing the list to indicate</u> that the given multicast packet stream is permitted for forwarding over <u>the ingress port</u>” <i>E.g.</i>, Blease: Regarding control unit 44, including OIF mapper 50 and multicast forwarding information 48, distributed within IFCs 54: • Fig. 4

'394

Blease (EX1005), Weyman (EX1006)

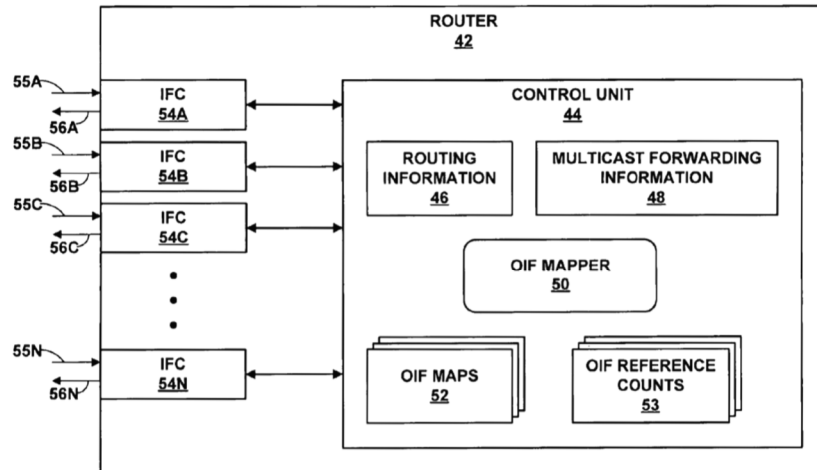


FIG. 4

- 11:54-57 (*see* claim 8[a.i])

Regarding distributing requests to control unit 44 and processing requests:

- 6:62-7:2 (“When a match is not found between a received membership request and the membership groups listed in OIF map 30, the membership request is not mapped to one of OIFs 29. In the case where an interface carrying a membership request is not configured to use an OIF map, network device 24 may send the requested multicast stream on an unmapped OIF. The unmapped OIF may comprise the interface carrying the membership request.”)
- 10:12-13 (“The one of IFCs 54 forwards the received membership request to control unit 44.”)
- 14:10-20 (“OIF mapper 50 determines whether the interface on which the membership request was received is configured to use one of OIF maps 52.... When the interface on which the membership request was received is not a mapping interface (no branch of 64), OIF mapper 50 adds an unmapped interface to multicast forwarding information 48 (65). The unmapped interface may transmit the requested

'394	Blease (EX1005), Weyman (EX1006)
	<u>multicast stream substantially similar to conventional transmission techniques.”)</u> • <i>See also</i> 8:29-38, 11:34-45.
8[e]. selectively forwarding multicast packets associated with the given multicast packet stream by the processing units in accordance with the respective updated lists,	Blease discloses selectively forwarding multicast packets associated with the given multicast packet stream by the processing units in accordance with the respective updated lists (e.g., the multicast stream is pushed to a network switch over the mapped OIF that was mapped by OIF mapper 50 in multicast forwarding information 48). Lavian, ¶¶130-132. Blease discloses receiving a request for a multicast stream, mapping the multicast stream to an OIF, and updating multicast forwarding information 48 with the mapping, as discussed for claim 8[d]. Blease further discloses selectively forwarding received multicast stream packets to mapped OIFs in accordance with the updated multicast forwarding information 48. Blease, Fig. 6B, 8:64-67, 10:49-52, 14:50-57. Lavian, ¶131. <i>E.g.</i>, Blease: • 8:64-67 (<i>see</i> claim 8[b]) • 10:49-61 (<i>see</i> claim 8[b]) • Fig. 6B (step 82)

'394	Blease (EX1005), Weyman (EX1006)
	<pre> graph TD A[A] --> 74[MAP MEMBERSHIP REQUEST TO OUTGOING INTERFACE GIVEN IN OUTGOING INTERFACE MAP] 74 --> 75[ACCESS MULTICAST FORWARDING INFORMATION] 75 --> 76{OUTGOING INTERFACE INCLUDED?} 76 -- YES --> 77[INCREMENT REFERENCE COUNT ASSOCIATED WITH MAPPED OUTGOING INTERFACE] 76 -- NO --> 78[ADD MAPPED OUTGOING INTERFACE TO MULTICAST FORWARDING INFORMATION] 78 --> 80[INITIALIZE REFERENCE COUNT ASSOCIATED WITH MAPPED OUTGOING INTERFACE] 80 --> 77 77 --> 82[SEND MULTICAST STREAM ON MAPPED OUTGOING INTERFACE] </pre> FIG. 6B • 14:50-57 (<i>see</i> claim 8[b])
8[f.i]. wherein operating the network element comprises initializing a new processing unit added to the network element by:	Weyman discloses that operating the network element comprises initializing a new processing unit added to the network element (<i>e.g.</i>, updating the configuration of a unit added to the distributed router fabric). Lavian, ¶¶133-135. Weyman teaches a process of adding a processing unit to a router fabric by, <i>e.g.</i>, updating the processing unit's configuration. Weyman, [0069]. A POSA would have been motivated to operate Blease's router to accommodate an additional unit or IFC, in view of Weyman, to, <i>e.g.</i>, replace a disabled unit, as discussed in §VII.A.3. Lavian, ¶134. <i>E.g.</i>, Weyman: • [0069] ("For the routers to operate as a single

'394	Blease (EX1005), Weyman (EX1006)
	distributed router every defined router configuration should be identical on all units in the fabric. Preferably the configuration is stored in non-volatile storage in all the units. <u>If the system can accommodate the addition or removal of units, then when a unit with a default configuration joins the fabric, it needs to update its configuration to that of the distributed router.</u>") • See also [0156].
8[f.ii]. deactivating the ports to which the new processing unit is assigned; 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	Weyman discloses sending a multicast status request, receiving multicast membership reports sent by multicast clients in response to the multicast status request, [and] constructing the list by the new processing unit based on the received multicast membership reports (e.g., sending query messages to determine client multicast group memberships; maintaining a multicast distribution tree with information reported). Lavian, ¶¶136-140. Weyman teaches a process determining multicast group memberships by sending query messages from a router, receiving client reports in response, and then maintaining a multicast distribution tree based on the reports. Weyman, [0160]-[0162]. A POSA would have been motivated to operate Blease's router to accommodate an additional unit or IFC and to update its configuration via a multicast membership query, in view of Weyman, to, e.g., replace a disabled unit, as discussed in §VII.A.3. Lavian, ¶¶138-139. Furthermore, a POSA would have been motivated to configure the configuration update to be performed while the processing unit (and its ports) is deactivated (<i>i.e.</i>, deactivating the ports to which the new processing unit is assigned as claimed) and activate the processing unit once it is updated (<i>i.e.</i>, after constructing the list, activating the ports to which the new processing unit is assigned, as claimed), to ensure that it is operating with information relevant to the router in which it is installed, as discussed in §VII.A.3. Lavian, ¶¶93-94, 139. <i>E.g.</i>, Weyman:

'394	Blease (EX1005), Weyman (EX1006)
after constructing the list, activating the ports to which the new processing unit is assigned.	• [0161] (“<u>Query messages are sent by IP multicast routers to determine the group membership of clients on an attached sub-network.</u>”) • [0162] (“Report messages can be generated by the client units in order to route query messages or a change in an applicant's multicast membership. <u>Changes in the multicast membership reported may affect the multicast distribution tree that the router maintains.</u> Any changes to the multicast distribution tree must be kept synchronised for all the units in the fabric.”) • <i>See also</i> [0160].
18[pre]. A network element, comprising;	<i>See</i> claim 8[a.i].
18[a]. multiple ports; and	<i>See</i> claim 8[a.i].
18[b.i]. multiple interconnected processing units,	<i>See</i> claim 8[a.i].
18[b.ii]. wherein each processing unit is assigned to a different subset of the multiple ports of the network element, and	<i>See</i> claim 8[a.ii].
18[b.iii] wherein each processing unit contains a	<i>See</i> claim 8[a.ii].

'394	Blease (EX1005), Weyman (EX1006)
processor for processing packets communicated over the different subset of the multiple ports to which the processing unit is assigned,	
18[b.iv] wherein the processing units are configured to process packets that are communicated over respective subsets of one or more of the ports,	Blease discloses that the processing units are configured (<i>e.g.</i>, control unit 44 is a processor executing software instructions) to process packets that are communicated over respective subsets of one or more of the ports (<i>e.g.</i>, requests are received on inbound links 55A-55N, streams are sent over outbound links 56A-56N as determined by control unit 44; <i>see</i> claim 8[a.ii]). Lavian, ¶¶110-112. As discussed for claim 8[a.ii], Blease discloses that the control units 44 process packets communicated over links 55 and 56. <i>See</i> claim 8[a.ii]. Furthermore, Blease discloses that the control units 44 are configured for performing processing functions. For example, control unit 44 is implemented solely in software, or hardware, or a combination, such as a processor executing software instructions. Lavian, ¶112. <i>E.g.</i>, Blease: • 11:63-12:3 (“<u>Control unit 44 may be implemented solely in software, or hardware, or may be implemented as a combination of software, hardware or firmware. For example, control unit 44 may include one or more processors which execute software instructions. In that case, the various software modules of control unit 44, such as multicast group table manager 50, may comprise executable instructions stored on a computer-readable medium, such as computer memory or hard disk.</u>”)

'394	Blease (EX1005), Weyman (EX1006)
18[b.v] to store respective lists, each of which indicates all of one or more multicast packet streams that are permitted for forwarding by the network element and further indicates which of the one or more ports multicast packet stream is permitted to be forwarded to,	<i>See claim 8[b].</i>
18[b.vi] to receive from a client a request relating to reception of a given multicast packet stream, and	<i>See claim 8[c].</i>
18[c.i] to distribute the request among the processing units within the network element so as to update the lists responsively to the distributed request and	<i>See claim 8[d].</i>

'394	Blease (EX1005), Weyman (EX1006)
18[c.ii] to selectively forward multicast packets associated with the given multicast packet stream in accordance with the updated lists,	<i>See</i> claim 8[e].
18[d.i] wherein a new processing unit added to the network element is configured to initialize by:	<i>See</i> claim 8[f.i].
18[d.ii]. deactivating the ports to which the new processing unit is assigned; 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,	<i>See</i> claim 8[f.ii].

'394	Blease (EX1005), Weyman (EX1006)
constructing the list by the new processing unit based on the received multicast membership reports; and after constructing the list, activating the ports to which the new processing unit is assigned.	

B. Ground 2: Claim 9 is Obvious Over Blease in view of Weyman and Hu

1. Overview: Hu

Hu (EX1007) describes a system to allocate media streams including a content switch 102, such as a network content switch/router system or other edge system of an Internet Protocol Television (IPTV) network or other packet-based video distribution network. Hu, Fig. 1, Abstract, 2:56-61.

A content switch 102, as shown in Fig. 1 (below), includes processing logic 104 and multiple physical ports 122, 126, which may be logically grouped into a link aggregation group (LAG) 124, 128. Hu explains that “link aggregation refers to a grouping of multiple network links (i.e., communication channels or circuits) into one logical high bandwidth link, which may be used to route audio data, text

data, video data, or any combination thereof. A LAG refers to a set or group of physical ports, such as the first plurality of physical ports 122, which are logically grouped to form a single logical port to provide the high-bandwidth link.” Hu, 3:7-32. Lavian, ¶¶67-69.

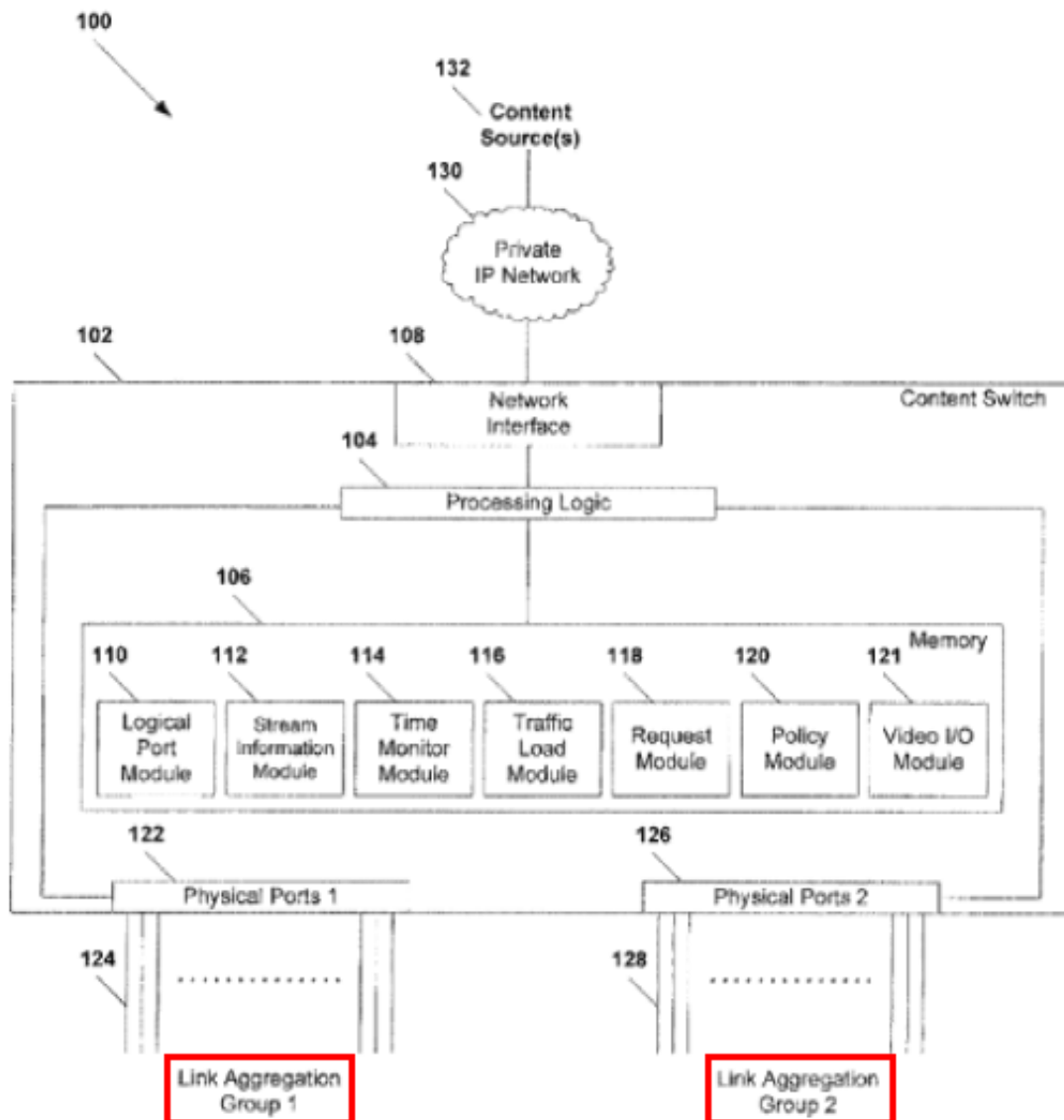


FIG. 1

In operation, upon receiving a request for a new data stream (e.g., a new multicast join request) via a link of a LAG, the content switch 102 determines a traffic load at each physical port associated with the LAG through which the request was received and compares the traffic load at each port with a pre-defined threshold. If the traffic load at all of the ports associated with the LAG meet or exceed the pre-defined threshold and an existing data stream cannot be dropped from any port, the new data stream request is rejected. Hu, 6:10-7:8. Lavian, ¶70.

Therefore, Hu describes a content switch that rejects a new multicast join request if the video traffic loads at all of the ports of the LAG exceed a predefined threshold.

2. Motivation: Blease in view of Weyman and Hu

Blease, Weyman, and Hu are in the same field as the '394—e.g., computer and networking technology. *See* §VII.A.3; Hu, 1:6-7, 6:10-22 (relating to multicast streams). Lavian, ¶143.

As explained in §VII.A.1 and further in §VII.A.4 above, Blease discloses a network device, such as router 42, including a plurality of interface cards (IFCs) 54 interconnected by a control unit 44, which is configured to determine, maintain, and use routing information to forward multicast streams to subscribers in response to subscriber requests. Blease further discloses different configurations of its system, for example distributing control unit 44 and its functionality within the

plurality of IFCs 54. Blease, 4:24-27, 11:54-57. However, Blease leaves to the POSA how to implement these configurations, and Hu teaches implementation examples for network devices delivering multicast traffic. It would have been obvious to a POSA to modify Blease with these teachings taught by Hu for the reasons below. Lavian, ¶¶141-146.

Limiting streams on ports: As discussed with respect to at least claims 8[c]-8[e] above, Blease discloses receiving, from a subscriber device, a membership request for a multicast group so that the subscriber can receive content, then updating multicast forwarding information 48 in response, and then forwarding multicast packets in accordance with the updated multicast forwarding information 48. Blease, 6:62-7:2, 8:64-67, 9:14-24, 10:6-13, 10:49-52, 14:3-5, 14:10-20, 14:50-57. Blease further discloses tracking the number of subscribers receiving multicast streams for each outgoing interface, to, *e.g.*, remove mapping information for multicast groups with zero subscribers. Blease, 11:5-17.

To the extent PO argues that Blease does not disclose tracking information to limit the number of streams permitting on a given port, Hu teaches using pre-defined thresholds to limit the number of streams using a particular link, such as a link aggregated group (LAG) of ports. For example, if video traffic loads at all of the ports of a LAG would exceed a pre-defined threshold, then a request for a video stream may be rejected. Hu, 5:13-22, 6:39-50. Hu teaches that limits on the

number of streams are important for video streams because if “insufficient bandwidth [is allocated] to video streams, the quality of service degrades.” Hu, 1:20-29. Moreover, fluctuations from variable video bitrates exacerbate the issue, further highlighting the need for limits. Hu, 1:16-19, 1:58-62. Thus, by ensuring that a limit to the number of connections on a link are not exceeded, and by rejecting subscriber requests if such limits would be exceeded, quality of service is maintained. Lavian, ¶¶144-145.

Accordingly, a POSA would have been motivated to limit the number of number of streams permitted over Blease’s links to ensure that transmissions of packets are performed efficiently without exceeding bandwidth limits. Lavian, ¶145.

Furthermore, the above modification would have been, at least, the application of a known technique (*e.g.*, Hu’s teaching of stream limits) to a known system ready for improvement (*e.g.*, enhancing Blease’s output links 56 of router 42) to yield predictable results (*e.g.*, to provide benefits from load balancing among the links). *See* MPEP §2143 (citing *KSR*, 550 U.S. at 415-421).

A POSA would have had a reasonable expectation of success modifying Blease’s system to limit the number of streams on its links, as taught by Hu. The modifications to Blease merely require techniques well-known to, and within the

ordinary skill of, POSAs, such as the use of basic decision-making steps using measurable communication statistics. Lavian, ¶¶34-36, 146.

Claim 9 is therefore obvious over Blease in view of Weyman and Hu. Lavian, ¶¶141-153.

3. Claim Charts

'394	Blease (EX1005), Weyman (EX1006), Rao (EX1024)
9[pre]. The method according to claim 8,	See claim 8 in §VII.A.4.
9[a.i]. wherein updating the list comprises modifying the list to indicate that the given multicast packet stream is permitted for forwarding over a given port	Blease in view of Weyman discloses that updating the list comprises modifying the list to indicate that the given multicast packet stream is permitted for forwarding over a given port. As discussed for claim 8[d], Blease in view of Weyman discloses that updating multicast forwarding information 48 includes modifying to indicate that a given multicast packet stream, for example as identified from the client request as discussed for claim 8[c], is permitted for forwarding over a given interface.
9[a.ii] only when a number of the multicast packet streams that are permitted for forwarding over the given port, including the given multicast packet stream, does not exceed a maximum value	Hu teaches that the given multicast packet stream is permitted for forwarding only when a number of the multicast packet streams that are permitted for forwarding over the given port, including the given multicast packet stream, does not exceed a maximum value specified for the given port (e.g., if the traffic load at a LAG can take on the new request without exceeding a pre-defined threshold, then the request is assigned to the LAG). Lavian, ¶¶147-153. In addition to Blease's disclosure of updating the multicast forwarding information 48 to map a request, as discussed for claim 8[d], Hu teaches that, responsive to a request, requests will only be granted, and streams will only be forwarded on a

'394	Blease (EX1005), Weyman (EX1006), Rao (EX1024)
specified for the given port.	LAG, if a pre-defined threshold for the number of streams on the LAG is not exceeded. Hu, 5:31-43, 5:44-56, 6:39-7:8. The pre-defined threshold is used, <i>e.g.</i>, to reject a request for another multicast stream if loads on a LAG would exceed the pre-defined threshold. Hu, 6:39-50; <i>see also</i> 5:22-29 (other statistical thresholds include “a ratio of streams to traffic load” and other statistics), 13:8-10 (estimated traffic load based on a number of join and leave requests). The pre-defined threshold therefore sets an upper limit on a number of streams using the LAG. A POSA would have been motivated to modify Blease to only modify the lists if the pre-defined threshold is not exceeded, as taught by Hu, to, <i>e.g.</i>, ensure that a certain quality of service is maintained, as discussed in §VII.A.3. Lavian, ¶¶149, 152. Additionally, PO appears to assert that the broad concept of load-balancing satisfies a different limitation in independent claim 1 of the '394 that limits the number of multicast streams over a high-capacity port. EX1013, 17-18.⁶ As Hu's teachings improve upon prior art “static load-balancing algorithm[s]” by “measuring real-time port usage related to each physical port associated with a link aggregation group,” they themselves describe load-balancing and further render the claim obvious for that reason. Hu, 1:43-45, 2:13-16. Furthermore, Hu teaches that traditional load-balancing algorithms were known to “assign traffic flows” and “provide a fairly equal distribution across the aggregated ports” by taking into account stream counts. Hu, 1:43-62. To the extent PO argues that Hu's above teaching of limiting the number of multicast packet streams using a pre-defined threshold for video traffic loads does not satisfy this limitation because it does not set a the limit to a specific

⁶ See 35 U.S.C. §301(a)(2) (permitting submission of patent owner statements made in Federal court and pertaining to a position on claim scope).

'394	Blease (EX1005), Weyman (EX1006), Rao (EX1024)
	“number” of streams, it would have been obvious to a POSA to implement such load-balancing via limits on stream “counts” because that was a well-known and traditional load-balancing method for distributing traffic across aggregated ports, as taught by Hu. Lavian, ¶¶36, 150-152. <i>E.g.</i>, Hu: • 5:13-22 (“In a particular embodiment, the memory 106 can include a <u>policy module 120 that stores data indicating threshold video traffic loads</u>. The policy module 120 can be executable by the processing logic 104 to compare the video data traffic load at each of the first plurality of physical ports 122 with a <u>pre-defined threshold</u>. If video traffic loads at all of the first plurality of physical ports 122 exceed the <u>pre-defined threshold</u>, policy module 120 can be executable by the processing logic 104 to reject the request for the video stream.”) • 5:31-43 (“If video traffic loads at one or more of the first plurality of physical ports 122 are lower than the pre-defined threshold, the request module 118 can be executable by the processing logic 104 to identify a port having the lowest video traffic load. <u>The request module 118 can be executable by the processing logic 104 to determine whether a total video traffic load, including the current video traffic load and a traffic load associated with the requested video stream, would exceed the threshold</u>. If not, <u>the video input/output module 121 can be executable by the processing logic 104 to send the requested video stream via the port having the lowest video traffic load</u>. Otherwise, the request module 118 can be executable by the processing logic 104 to reject the request for the video stream.”) • 5:44-56 (“In an illustrative, non-limiting embodiment, the request module 118 can <u>determine, before rejecting the request, whether an existing stream can be dropped at one of the first plurality of physical ports 122, such</u>

'394	Blease (EX1005), Weyman (EX1006), Rao (EX1024)
	<u>that the video traffic load at the port does not exceed the threshold after the new video stream is added at the port. If no stream can be dropped at any of the ports such that the threshold can be satisfied, the request module 118 can be executable by the processing logic 104 to reject the request for the video stream. Otherwise, the video input/output module 121 can be executable by the processing logic 104 to discontinue the existing video stream and to assign the requested video stream via the port at which the existing stream has been dropped.”)</u> • 6:26-32 (“<u>The traffic loads determined by the switch/router system can be current real-time traffic loads that include a traffic load measured for each port at a most recent time measurement point, adjusted to reflect each join request and each leave request received at the switch/router system since the most recent time measurement point, which affects data sent via the port.</u>”) • 6:39-7:8 (“<u>Proceeding to block 206, the switch/router system compares the traffic load at each port with a pre-defined threshold stored at the switch/router system. Continuing to decision node 208, the switch/router system determines whether the traffic loads at all of the ports associated with the link aggregation group meet or exceed the pre-defined threshold. If the traffic loads at all of the ports associated with the link aggregation group meet or exceed the pre-defined threshold, the method advances to decision node 216. On the other hand, if one or more of the ports associated with the link aggregation group is lower than the pre-defined threshold, the method advances to block 210.</u> At block 210, the switch/router system identifies a port associated with the link aggregation group having a lowest load (i.e., identifies a port having the most available bandwidth to accept a new stream). Moving to block 212, the switch/router system adds an estimated

'394	Blease (EX1005), Weyman (EX1006), Rao (EX1024)
	bandwidth associated with the requested data stream to the load at the identified port, thereby producing a total traffic load. <u>Continuing to decision node 214, the switch/router system determines whether the total traffic load meets or exceeds the pre-defined threshold. If the total traffic load is lower than the pre-defined threshold, the method moves to block 215, and the data stream is assigned to the identified port.</u> Whereas, if the total traffic load meets or exceeds the pre-defined threshold, the method proceeds to decision node 216. <u>Proceeding to decision node 216, the switch/router system determines whether an existing data stream can be dropped at any of the ports associated with the link aggregation group, such that a total traffic load at the port at which the existing data stream is dropped is lower than the pre-defined threshold. If such a data stream can be dropped, the method proceeds to block 215, and the requested video stream can be assigned to the port at which the existing data stream is dropped.</u> Conversely, if such a data stream cannot be dropped, the method moves to block 218, and the request is rejected by the switch/router system. The method terminates at 220.”) • 13:8-10 (“<u>estimating the total traffic load on a port based on the average bit rate and based on a number of join and leave requests associated with the group.</u>”)

C. Ground 3: Claim 10 is Obvious Over Blease in view of Weyman, Hu, and Deng

1. Overview: Blease, Weyman, Hu, and Deng

Claim 10 of the '394 depends from claim 8 and recites:

The method according to claim 8, wherein updating the list comprises tracking a use of a permission to forward a

certain multicast packet stream over a certain port by monitoring requests relating to the certain multicast packet stream that are received at the network element, and removing the permission from the list responsively to determining that the permission is aged.

Blease in view of Weyman discloses the method of claim 8. *See* §VII.A.

Blease in view of Weyman and Deng discloses claim 10. Lavian, ¶¶154-163.

As discussed for claim 8 above, Blease in view of Weyman discloses “updating the respective list ... responsively to the request” by, *e.g.*, updating multicast forwarding information 48 in response to a request to join a multicast group. *See* claims 8[c]-8[d] in §VII.A.4.

Deng further teaches that, in response to a request to join a multicast group, a multicast address is stored in a multicast address table of attached hosts, and a timer is started to “determine the length of time that an address remains in the multicast address table.” Deng, [0018], [0031], [0035]-[0036]. The “address is removed from the table upon the expiration of the timer.” Deng, [0036]. Deng therefore teaches “track[ing] a use of a permission to forward a certain multicast packet stream over a certain port by monitoring requests relating to the certain multicast packet stream that are received at the network element” by storing the address of a host joining a multicast group in a multicast address table and associating a timer with the added address, and further “removing the permission

from the respective lists responsively to determining that the permission is aged” by removing the address from the multicast address table when the timer expires. Lavian, ¶¶71-73, 157.

2. Motivation: Blease in view of Chen, Hu, and Deng

Blease, Weyman, and Deng are in the same field as the ’394—*e.g.*, computer and networking technology. *See* §VII.A.3; Deng, [0002] (relating to network switches and multicasting). Lavian, ¶156.

As discussed with respect to at least claims 8[c]-8[e] above, Blease discloses receiving, from a subscriber device, a membership request for a multicast group so that the subscriber can receive content, then updating multicast forwarding information 48 in response, and then forwarding multicast packets in accordance with the updated multicast forwarding information 48. Blease, 6:62-7:2, 8:64-67, 9:14-24, 10:6-13, 10:49-52, 14:3-5, 14:10-20, 14:50-57. Blease further discloses tracking the number of subscribers receiving multicast streams for each outgoing interface, to, *e.g.*, remove mapping information for multicast groups with zero subscribers. Blease, 11:5-17.

To the extent PO argues that Blease does not disclose additional tracking functions, such as tracking the age of a permission and removing aged permissions, Deng teaches the particular policy to automatically drop streams by tracking multicast addresses and removing them after expiration of a timer, as discussed

above. A POSA would have been motivated to modify Blease and Weyman to track requests and forwarded multicast streams based on a timer, and to automatically drop streams after a period of time—*e.g.*, by removing mappings from multicast forwarding information 48—in order to provide a simple time-based method for maintaining sufficient bandwidth and overhead for streams, thereby increasing the quality of service of multicast streams. Hu, 1:11-19 (video content is bandwidth intensive and variable bitrates can hinder accurate estimation of traffic; more headroom may be required), 6:65-7:8 (dropping existing streams frees bandwidth for new requests). Lavian, ¶¶157-158, 162.

Furthermore, the above modification would have been, at least, the application of a known technique (*e.g.*, Deng’s disclosure of dropping streams based on time) to a known system ready for improvement (*e.g.*, in the system of Blease in view of Weyman, bandwidth is maintained by dropping streams) to yield predictable results (*e.g.*, automatically dropping streams and freeing bandwidth to accommodate requests on the high-bandwidth link). *See* MPEP §2143 (citing *KSR*, 550 U.S. at 415-421).

A POSA would have had a reasonable expectation of success modifying the system of Blease and Weyman to remove mappings from multicast forwarding information 48 based on a timer. Indeed, Deng discloses that counting mechanisms are conventionally found in hardware and software (*see* Deng, [0031]), and the

updating of multicast forwarding information 48 uses basic data processing techniques well known to a POSA and already present in Blease (*see* Blease, 10:52-53 (control unit 44 updates multicast forwarding information 48). Lavian, ¶159.

D. Ground 4: Claims 8 and 18 are Obvious Over Blease in view of Weyman and Rao

1. Overview: Blease, Weyman, Rao

Blease (EX1005) and Weyman (EX1006) are described above. *See* §§VII.A.1-VII.A.2.

Rao (EX1024) teaches, in relation to the initialization and activation of a standby route processor manager card (RPM) when a master RPM fails, “generat[ing] Host Membership Queries on its connected networks to solicit membership information from attached IGMP hosts” and starting a “delay timer.” Rao, 9:3-17. Responses to the queries are used to create entries in routing tables, identifying multicast groups and ports for directing multicast traffic. Rao, 9:18-46. When it is determined that all expected responses have been received (for example through receipt of end of tree information base (EOTIB) markers), or if the delay timer runs out, any outstanding route entries in the tables that may have existed and carried over from the failed RPM are pruned, thereby leaving entries representative of the current multicast state. Rao, 9:47-65. Then the RPM “activat[es] the internal

router path IP multicast forwarding information for data path forwarding.” Rao, 9:57-59, 11:20-22, 11:29-32, 11:33-44. Lavian, ¶¶75-76, 174.

Rao therefore teaches to initialize a processing unit by activating the processing unit only after multicast membership information is solicited and a period for reply has elapsed. That is, Rao teaches “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 after constructing the list, activating the ports to which the new processing unit is assigned,” as claimed in claims 8 and 18 of the ’394. And, while Rao does not explicitly state to first “deactivat[e] the ports to which the new processing unit is assigned,” because Rao teaches that the RPM being initialized was a “standby RPM” to a master RPM that failed, and because the RPM’s “internal router path IP multicast forwarding information” is “activat[ed]” after constructing table entries, as discussed above, a POSA would have recognized that the RPM and its ports would have been “deactivated” prior to being ready for normal operations. Lavian, ¶¶175.

2. Motivation: Blease in view of Weyman and Rao

Blease, Weyman, and Rao are in the same field as the ’394—*e.g.*, computer and networking technology. *See* §VII.A.3; Rao, 1:7-2:67 (relating to multicast data packet forwarding and routers used for processing the same). Lavian, ¶¶167.

Blease in view of Weyman renders obvious claims 8 and 18 of the '394. *See* §§VII.A.3-VII.A.4. For the reasons explained therein, it would have been obvious to a POSA to initialize a new processing unit by deactivating the ports of the processing unit, sending a multicast or IGMP group membership query to determine client memberships in the network, updating the processing unit's multicast distribution tree information (*e.g.*, multicast forwarding information 48), and then activating the ports of the processing unit to process packets according to the updated multicast information. Lavian, ¶168.

To the extent PO argues that additional disclosure is required—*e.g.*, with respect to any purported timing of the steps specifically claimed in claims 8[f.i]-8[f.ii] and 18[d.i]-18[d.ii] of the '394 (*see* §VII.A.4 above)—Rao explicitly teaches that the initialization of a processing unit for multicast packet routing takes the steps of deactivating the ports of the processing unit, requesting multicast membership reports, constructing lists of multicast stream forwarding information in response, and then activating the ports of the processing unit, as discussed in detail above. A POSA would have been motivated to look to known implementation procedures, such as those taught by Rao, in implementing the procedure of adding a processing unit to a router, as taught by Blease and Weyman, to the extent such details are required by the POSA. As discussed above in §VII.A.3, a POSA would have recognized that a new unit (and its ports) would

be deactivated and not be activated until it has had a chance to create and/or update its forwarding tables with the current state of multicast memberships. As Weyman explains, a newly added unit may have a “default configuration.” Weyman, [0069]. It would not be reasonable to a POSA to use a component’s default configuration, which may have been set at manufacture or set in a prior installation and contain information that is likely irrelevant or, worse, that conflicts with the other processing units of the router. Rao makes this clear: a new processing unit should not operate in an inconsistent manner with respect to the multicast state prior to its activation, and therefore it should assess the current state through membership queries prior to activation. Rao, 9:66-10:7. Lavian, ¶¶169, 175.

Accordingly, a POSA would have been motivated to initialize a new processing unit by deactivating ports, sending a multicast status request, constructing the list based on received multicast membership reports, and activating the ports, as claimed in claims 8 and 18 of the ’394, as taught by Blease in view of Weyman and Rao, to ensure that the processing unit operates according to the current multicast state. Lavian, ¶¶168-169, 176.

Furthermore, the above modification would have been, at least, the use of a known technique (*e.g.*, Rao’s teachings of querying memberships and updating tables prior to activation) to improve similar devices (*e.g.*, improving Blease’s router 42 by initializing a new processing unit) in the same way (*e.g.*, to initialize

the processing unit according to the current multicast state). *See* MPEP §2143 (citing *KSR*, 550 U.S. at 415-421).

A POSA would have had a reasonable expectation of success modifying Blease’s system to accommodate an additional processing unit or IFC 54 by disabling the processing unit ports, updating its multicast forwarding information, and then activating the processing unit ports, as taught by Weyman and Rao. Indeed, Blease discloses that activating and deactivating interfaces and updating multicast forwarding information were known router functions. Blease, 11:34-45, 11:53-57. Lavian, ¶170.

Claims 8 and 18 are therefore obvious over Blease in view of Weyman and Rao. Lavian, ¶¶164-177.

E. Grounds 5 and 6: Claim 9 is Obvious Over Blease in view of Weyman, Rao, and Hu; Claim 10 is Obvious Over Blease in view of Weyman, Rao, and Deng

Dependent claim 9 of the ’394 is obvious over Blease in view of Weyman and Hu, as discussed in §VII.B, and dependent claim 10 is obvious over Blease in view of Weyman and Deng, as discussed in §VII.C.

For the same reasons explained in the noted sections, which are directed to features unrelated to the limitations for which Rao is introduced in §VII.D (*i.e.*, Rao is introduced for “initializing a new processing unit” only), claim 9 of the ’394 is further obvious over Blease in view of Weyman, Rao, and Hu, and dependent

claim 10 is further obvious over Blease in view of Weyman, Rao, and Deng. Lavian, ¶¶178-181.

VIII. NO BASIS FOR DISCRETIONARY DENIAL

A. *Fintiv*

Under the Director’s Interim Procedure for Discretionary Denials, “the PTAB will not deny institution based on *Fintiv*^[7] if there is compelling evidence of unpatentability”^[8]—which this Petition provides. That should conclude the *Fintiv* analysis. *Nokia of Am. Corp. v. TQ Delta, LLC*, IPR2022-00471, Paper 11 at 19-21 (Aug. 18, 2022). In any event, the *Fintiv* factors all either weigh against discretionary denial, or are at least neutral.

⁷ *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (Mar. 20, 2020) (precedential).

⁸ *Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation*, USPTO Memorandum (June 21, 2022) https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf

1. Potential for Stay

Petitioner will seek a stay, but without “specific evidence” how the Court will rule, this factor is neutral. *Sand Revolution II, LLC v. Cont’l Intermodal Grp.–Trucking LLC*, IPR2019-01398, Paper 24, 7 (June 15, 2020) (informative).

2. Timing of Trial

As of this Petition’s filing, the court has neither entered a schedule nor set a trial date. In any event, the Board considers medial time-to-trial (Interim Procedure, 8-9)—34.6 months in the District of Massachusetts. EX1010. This puts trial in approximately July 2026, *well after* a final written decision in this IPR.

While the Eastern District of Texas median time-to-trial statistics suggest the Cisco Litigation could reach trial before a FWD herein, a pre-FWD trial involving an unrelated defendant does not favor discretionary denial. *Dolby Labs. v. Intertrust Techs.*, IPR2020-00665, Paper 11, 15-17 (Feb. 16, 2021) (*Fintiv* Factor 2 weighed against denial, despite pre-FWD trial in Texas, because petitioner “Dolby is not a party to the Texas Actions”).

Further, Petitioner filed this petition diligently, approximately four months before the Section 315(b) deadline. EX1011. *Fintiv*, Paper 11, 11 (filing an IPR petition “expeditiously...weigh[] against [denial]”); *Apple Inc. v. Seven Networks*, IPR2020-00235, Paper 10, 9-10 n.6 (July 28, 2020) (filing IPR petition four months before Section 315(b) deadline is “reasonably diligent”).

3. Litigation Investment

In the Juniper Litigation, no contentions have been exchanged and no discovery or claim construction proceedings have occurred. The lack of meaningful investment in the litigation disfavors denial. *Samsung Elecs. Co. v. Netlist, Inc.*, IPR2022-00063, Paper 13, 8 (May 5, 2022) (instituting IPR where no “claim construction and merits determinations” had occurred in the litigation).

4. Overlap of Issues

Patent Owner’s amended complaint asserts only claim 1. EX1012. This IPR addresses claims 8-10 and 18 of the ’394, claims 8 and 18 both being independent claims, and therefore will address claims that are not before the district court, which weighs against denial. *Google LLC v. Geoscope Techs. Pte. Ltd.*, IPR2023-01212, Paper 14, 15 (Feb. 20, 2024).

5. Litigation Defendant

Petitioner is the litigation defendant, which is “far from an unusual circumstance.” *Sand Revolution II*, Paper 24, 12-13. This factor is neutral.

B. §325(d)

1. ’394 Prosecution

The Examiner during prosecution of the ’394 did not consider Blease, Weyman, Rao, Hu, or art with substantially the same disclosures (or the same or substantially the same arguments) as those herein. The Examiner applied Deng to

reject a dependent claim, but the Examiner never discussed or applied Deng in combination with any of Blease, Weyman, Rao, or Hu.

2. Cisco IPR

Regarding the petition for IPR filed by Cisco Systems, Inc., filed just weeks before this Petition (EX1020; *see* §II.B) and still awaiting a preliminary response (if any) and a decision on institution, the petition therein advances grounds of invalidity based on prior art Weyman, Li⁹, Jain¹⁰, Rooholamini¹¹, Pitcher¹², LeMaire¹³, and Ding¹⁴, which are unrelated to Blease, Rao, Hu, and Deng applied herein. While Weyman is present in both the Cisco IPR petition (as a primary reference) and this Petition (as a secondary reference), the Cisco IPR petition does not discuss or apply Weyman in combination with any of Blease, Rao, Hu, or Deng.

Moreover, Cisco is a different party from Petitioner here, and no significant relationship exists between the parties. Petitioner and Cisco are accused of infringing the '394 patent with different products in different court proceedings

⁹ W.O. 2007/140702

¹⁰ U.S. 2006/0224877

¹¹ U.S. 2007/0297406

¹² U.S. 6,370,142

¹³ U.S. 5,999,530

¹⁴ U.S. 2006/0146823

(see §II.B) and have not coordinated regarding the '394 patent, the separately accused products, or the filing of petitions for IPR. Petitioner and Cisco may have further independent interests in pursuing IPR of the '394, as the primary reference used herein, Blease, is assigned to Petitioner. Unique claim construction and infringement theories may arise from these different positions. There is no basis for denial under §325(d). *See Ford Motor Company v. Neo Wireless LLC*, IPR2023-00763, Paper 28 (Mar. 22, 2024) and *American Honda Motor Co., Inc. v. Neo Wireless LLC*, IPR2023-00797, Paper 27 (Mar. 22, 2024) (vacating denials of institution based on *General Plastic*¹⁵ factors, finding no significant relationship between parties having different accused products that merely engage in court-ordered pretrial coordination).

3. Unified Reexamination

Regarding the request for *ex parte* reexamination filed by Unified Patents, LLC less than two months before this Petition (EX1019; see §II.B) and recently granted on 2024-04-19, the request therein advances substantial new questions of patentability based on prior art Naik¹⁶, Reader¹⁷, Deng-272¹⁸, Hu¹⁹, Ramanathan²⁰,

¹⁵ *General Plastic Industrial Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 at 16 (Sep. 6, 2017) (precedential as to §II.B.4.i)

¹⁶ U.S. 2006/0146857

and Schulte²¹. Naik, Reader, Ramanathan, and Schulte are unrelated to Blease, Weyman, Rao, and Hu applied herein. Furthermore, primary prior art Naik and prior art similar to secondary prior art Deng-272²² were previously applied during the original prosecution of the '394 (*see* §IV.B above) and therefore the instant Petition is distinguishable from the Unified Reexamination for the same reasons it is distinguishable from the original prosecution of the '394 and should not be discretionarily denied.

Discretionary denial under §325(d) is not warranted.

¹⁷ U.S. 2005/008901

¹⁸ U.S. 2005/0232272

¹⁹ U.S. 8,068,416 (EX1007)

²⁰ U.S. 2009/0279549

²¹ U.S. 7,174,390

²² Deng-272 applied in the Unified Reexamination is a parent of Deng applied in the original prosecution of the '394 and applied herein.

IX. CONCLUSION

The Board should institute IPR and cancel the Challenged Claims of the '394.

Dated: May 31, 2024

Respectfully submitted,

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CERTIFICATE OF SERVICE UNDER 37 C.F.R. §42.6 (e)(4)

I certify that on May 31, 2024, I will cause a copy of the foregoing document, including any exhibits or appendices filed therewith, to be served via United States Priority Mail Express at the address of record for the patent, and with courtesy copies being served to the listed attorneys, at:

Information in Patent Center	Service Addresses
Correspondence address 199006 - Villamar & Guiliana LLP Kramer Alberti Lim & Tonkovich LLP 373 Summer View Mission Viejo, CA 92692 UNITED STATES	Correspondence address of record: Villamar & Guiliana LLP Attn: Kramer Alberti Lim & Tonkovich LLP 373 Summer View Mission Viejo, CA 92692
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	Public address of Kramer Alberti Lim & Tonkovich LLP: Kramer Alberti Lim & Tonkovich LLP 577 Airport Boulevard, Suite 250 Burlingame, CA 94010

I further certify that I will cause courtesy copies of the foregoing documents, including any exhibits and appendices filed herewith, to be served via email to Patent Owner's counsel in IPR2024-00506, at the following address:

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I further certify that I will cause courtesy copies of the foregoing documents, including any exhibits and appendices filed herewith, to be served via email to Patent Owner's litigation counsel at the following address:

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CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. §42.24, the undersigned certifies that the foregoing IPR petition contains 13,989 words excluding a table of contents, a table of authorities, Mandatory Notices under §42.8, a certificate of service or word count, or appendix of exhibits or claim listing. Petitioners have relied on the word count feature of the word processing system used to create this paper in making this certification.

Date: May 31, 2024

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