

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. IPR2024-00913
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)
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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)

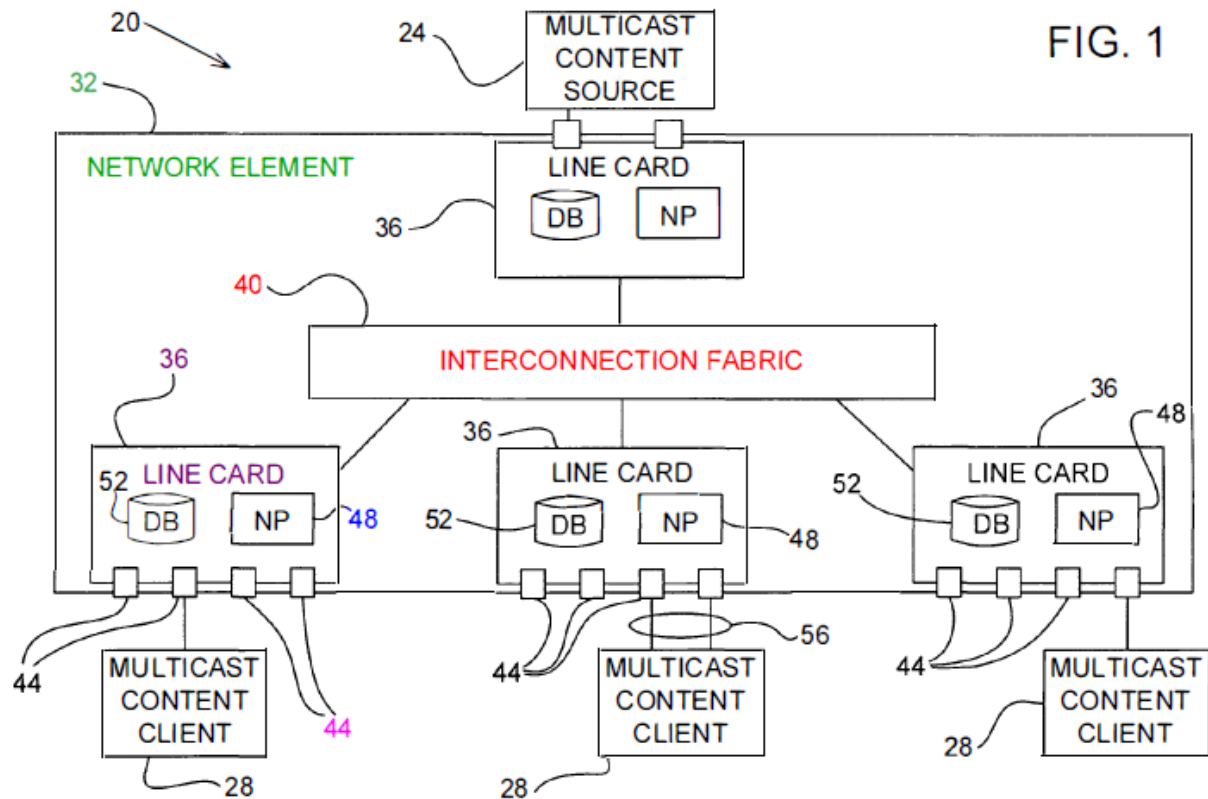
I. INTRODUCTION

Juniper Networks, Inc., requests *inter partes* review of claims 1-2, 4, 6-7, 11-12, 14 and 16-17 (“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 port aggregation, relying upon the IEEE 802.1AX standard for support. '394, 6:61-67. That is, these claims recited that two or more ports may be aggregated to form a high-capacity port or Link Aggregation Group (LAG) as taught by the standard. Of course, as the standard taught this aggregation, it was not new.

The aggregation dependent claims were further limited to a predetermined LAG capacity scheme. As explained in the specification: “[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.

The examiner mistakenly identified these original claims (dependent claims 7 and 25) as reciting allowable subject matter. And, after failing to distinguish the distributed multicast architecture from the art of record, PO conceded the unpatentability of the base architecture and amended the independent claims to include the aggregation features of dependent claims 7 and 25.²

But limiting LAG capacity and using other techniques to manage traffic load across member ports (*i.e.*, load balancing) so that no one member port was taxed with a disproportionate amount of the LAG traffic were known. Hu (EX1007), 1:13-35, 5:13-22, 6:39-50; Weyman (EX1006), [0050]; Chen (EX1009), 5:55-58. Adding decades old traffic management controls to a known telecommunication architecture is not an invention.

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

² Other dependent claims were indicated as reciting allowable subject matter, but those features are not recited in claims challenged here. For example, dependent claims 10 and 28 (issued as claims 8 and 18 of the '394) were also allowed, and Petitioner addresses those claims in a separate petition. *See* §II.B regarding Related Matters.

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:

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 (this Petition)
		IPR2024-00989

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)

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	1-2, 4, 6-7, 11-12, 14, 17	Blease in view of Weyman and Hu
2		16	Blease in view of Weyman, Hu, and Deng

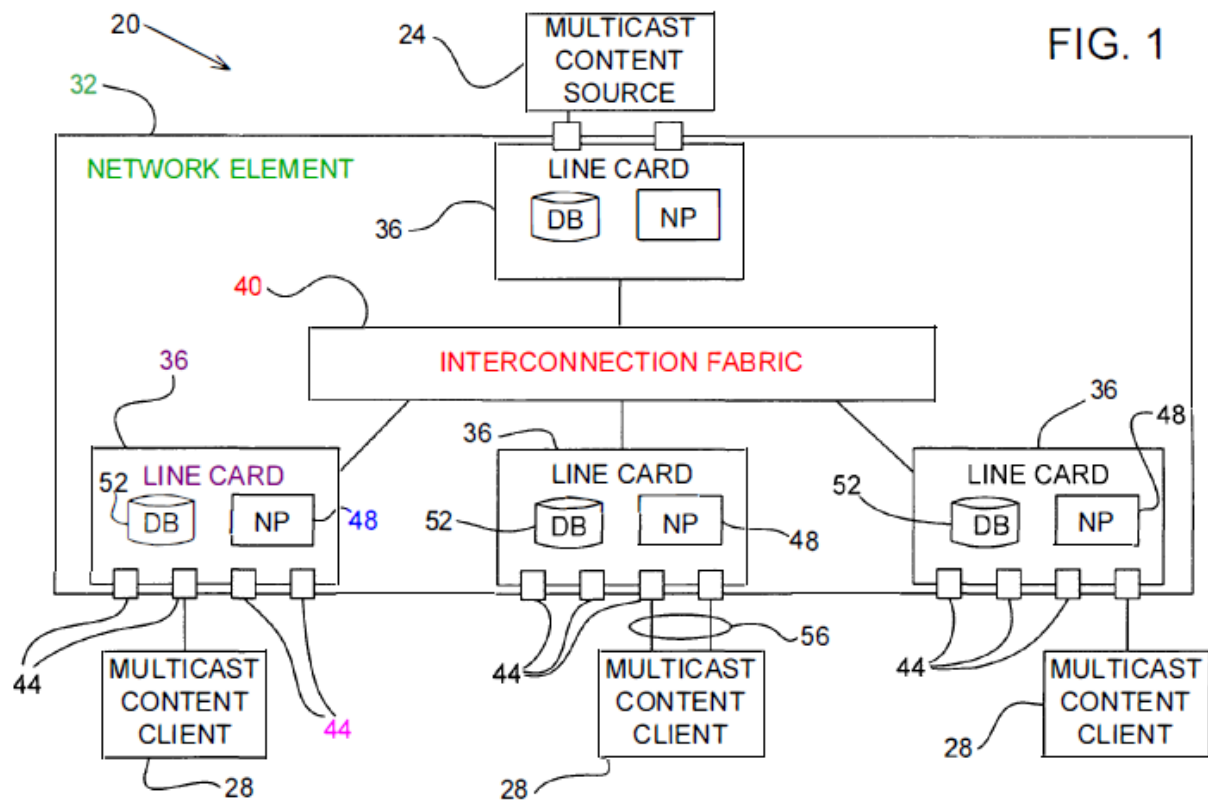
IV. BACKGROUND

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.

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.

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

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.

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 7 into

independent form, adding to the subject matter of independent claim 1, now canceled:

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

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

'394FH, 218-228. Dependent claim 25 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 7 and 25, the Examiner recited the limitations relating to aggregating ports and setting an upper limit, identified above. '394FH, 236-240.

The '394 issued 2011-09-06. Claims 7 and 25 issued as independent claims 1 and 11 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, ¶¶74-82.

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, ¶¶83-84.

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, ¶¶1-170. The prior art renders the Claims unpatentable for reasons discussed below.

A. Ground 1: Claims 1-2, 4, 6-7, 11-12, 14 and 17 are Obvious Over Blease in view of Weyman and Hu

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.

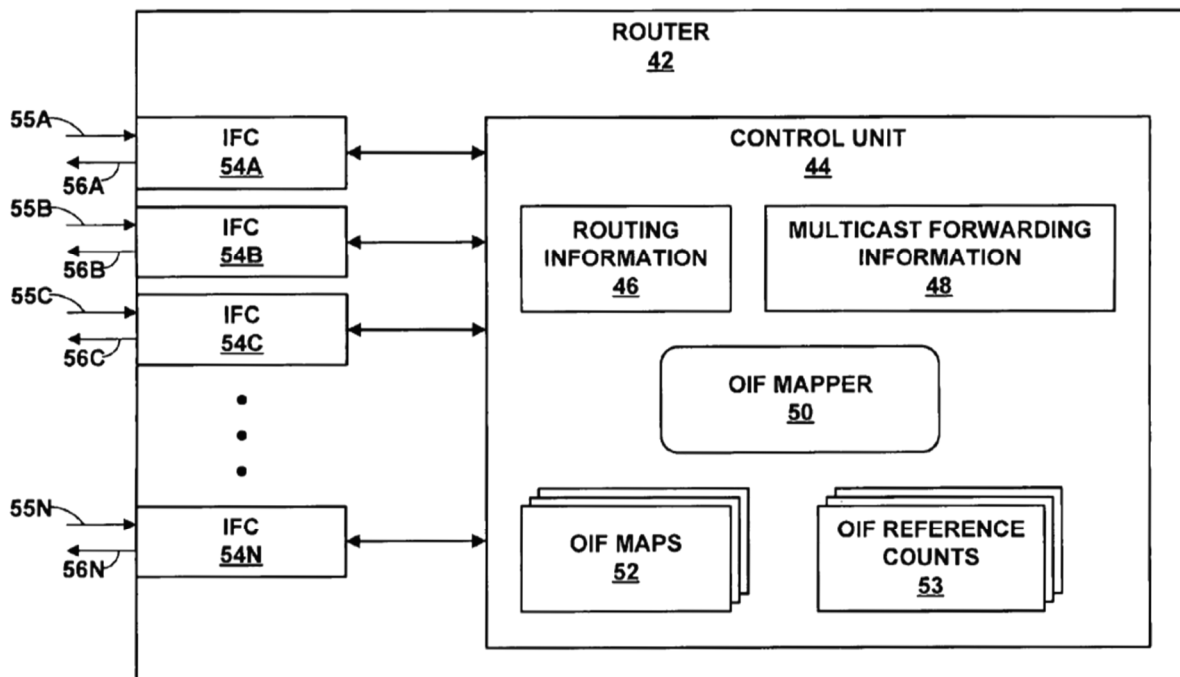


FIG. 4

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.

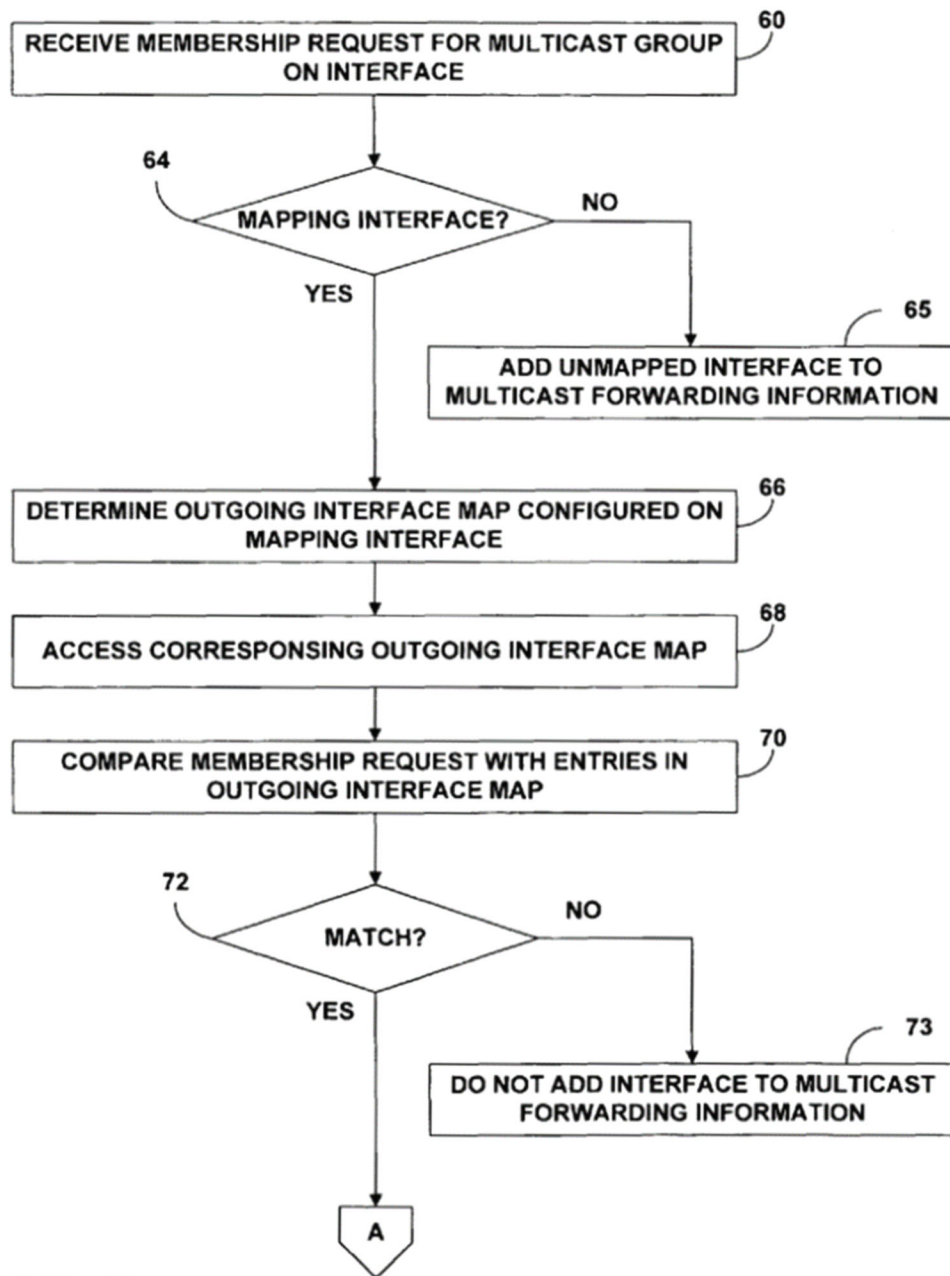


FIG. 6A

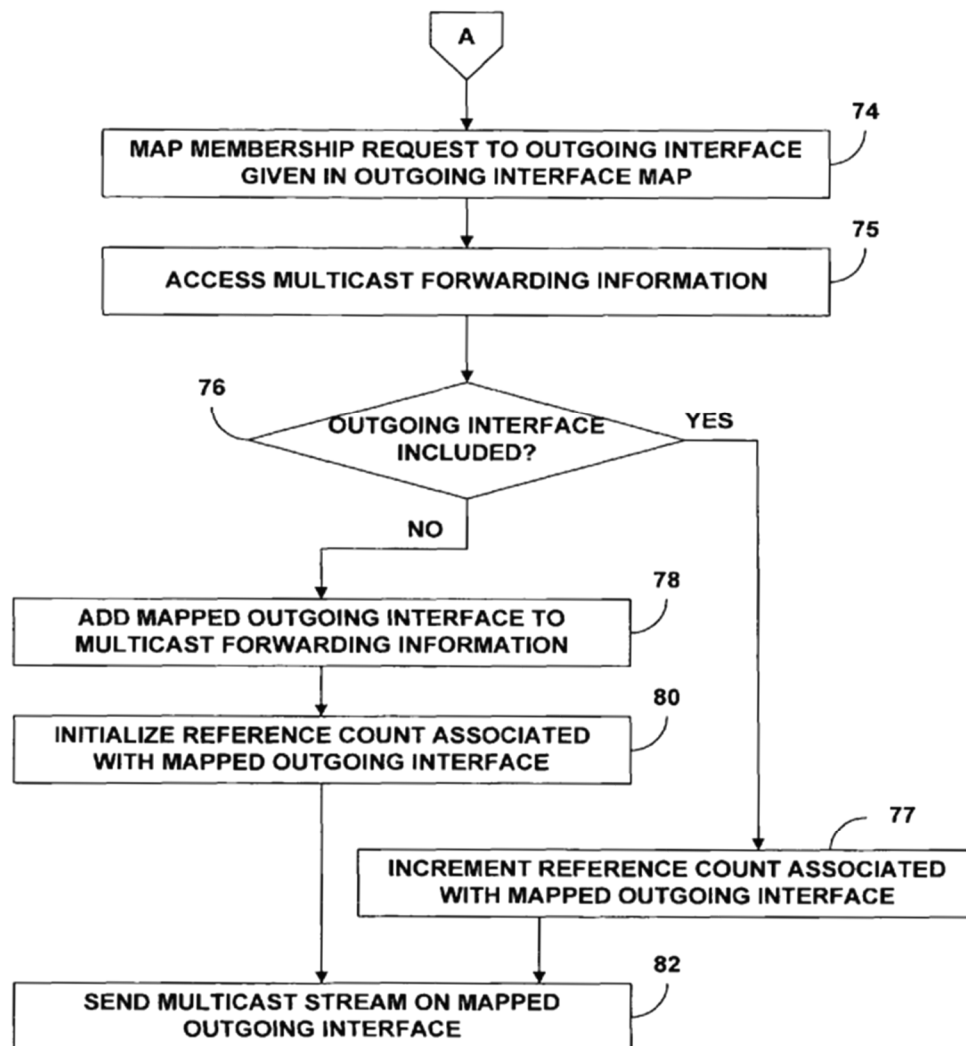


FIG. 6B

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.

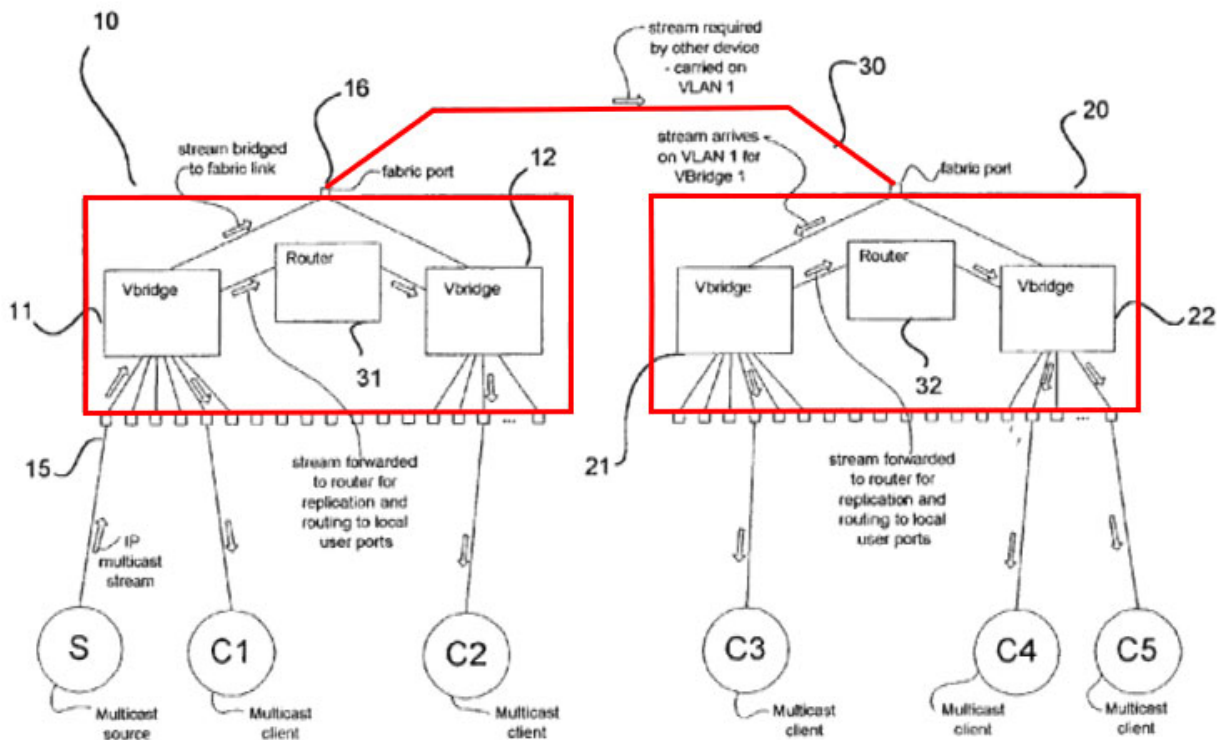


FIG.10

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]. Lavian, ¶66.

3. 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.

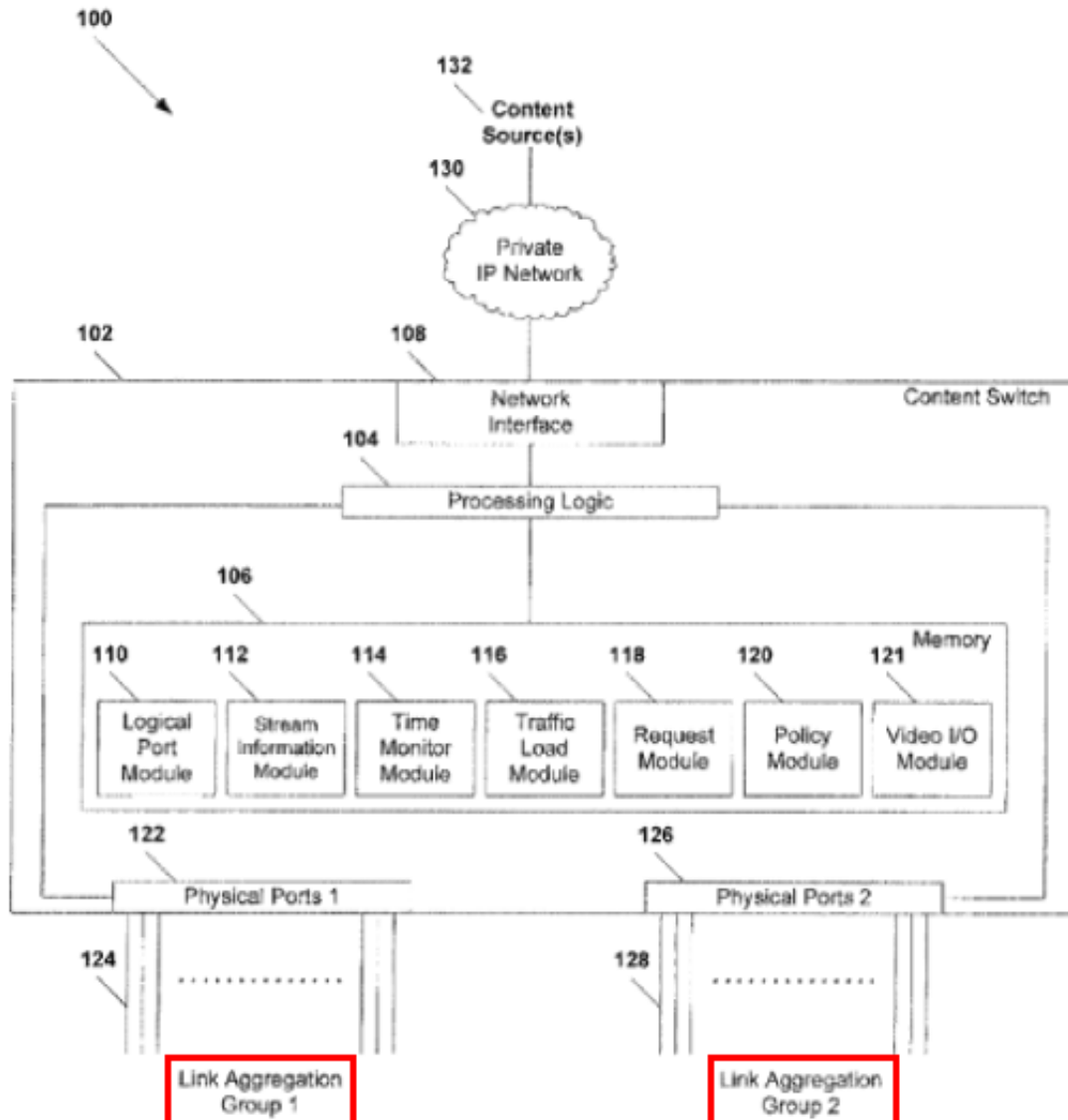


FIG. 1

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.

4. 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. '394, 1:6-8 (relating to communication networks, such as for delivering multicast traffic), Blease, 1:10-12; Weyman, [0001]; and Hu, 1:6-7, 6:10-22 (same). Lavian, ¶87.

As explained in §VII.A.1 and further in §VII.A.5 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 and aggregating outputs of a network switch for uploading

information to the network device. Blease, 4:24-27, 11:54-57. However, Blease leaves to the POSA how to implement these configurations, and Weyman and Hu teach 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, ¶¶86-95.

Distributing control unit 44 (regarding, e.g., claims 1[a.i] and 1[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, ¶88.

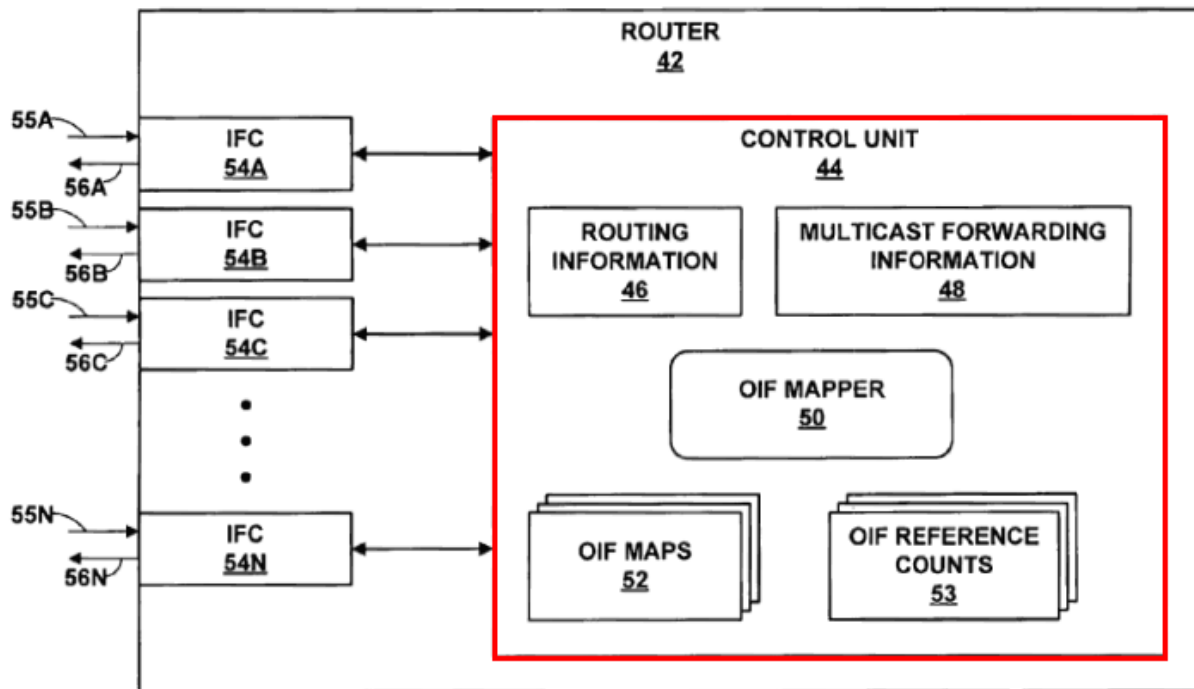


FIG. 4

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 1[a.i]) and how and what information to pass between the distributed control units 44 when analyzing received requests (with respect to claim 1[d]). Lavian, ¶88.

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, ¶89. 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, ¶90.

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)).

Aggregating ports and limiting streams on those ports (regarding, *e.g.*, claims 1[f] and 1[g]): Blease discloses that, for communications between a network switch 6 and a network device 4 (of which router 42 is an example), outputs from switch 6 are aggregated to form a high-speed link to the network device. Blease, 4:18-27, 8:41-43. To the extent PO argues that Blease does not disclose that links of network device 4 or router 42 do not similarly include aggregated outputs, links, or ports, a POSA would have been motivated to modify router 42's links, such as one or more of inbound links 55A-55N and outbounds links 56A-56N, to include aggregated ports that form one or more high-capacity ports and to place limits on those ports, as taught by Hu. Lavian, ¶92.

Hu teaches aggregating a plurality of ports into a single logical port, as a link aggregation group (LAG), to form a high-bandwidth port. Hu, 1:30-39, 3:10-32. High-bandwidth ports increase the utility of the ports because they are able to carry more streams and/or higher bitrate streams. Additionally, through the aggregation

of ports, packets may be shared or balanced among the ports, “increas[ing] overall utilization efficiency of network components and quality of service to end-users.” Hu, 1:13-15, 1:30-35; *see also* Chen, 5:55-58. Lavian, ¶93.

Hu further teaches using pre-defined thresholds to limit the number of streams using a particular LAG. 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 on a LAG 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 to a LAG are not exceeded, and by rejecting subscriber requests if such limits would be exceeded, quality of service is maintained. Lavian, ¶¶93-94.

Accordingly, a POSA would have been motivated to aggregate Blease’s ports into LAG and to limit the number of number of streams permitted over those groups to transfer more data (e.g., accommodating more streams or providing higher quality streams) and to do so efficiently without exceeding the bandwidth limits of the groups. Lavian, ¶¶92-94.

Furthermore, the above modification would have been, at least, the application of a known technique (*e.g.*, Hu’s teaching of port aggregation with 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 high-bandwidth links and benefits from load balancing among the aggregated ports). *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 include control units 44 at each IFC 54 and to interconnect them via a fabric, to aggregate ports to form high-capacity ports, and to limit the number of streams on those high-capacity ports, as taught by Weyman and Hu. 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. Blease, 11:53-57. Furthermore, Blease already discloses aggregating outputs to create high-speed links. Blease, 4:24-27. 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]), the application of known aggregation techniques⁴ already applied elsewhere in Blease to other

⁴ Indeed, the ’394 describes that the IEEE 802.1AX link aggregation standard was available as of 2008-11-03. ’394, 6:64-7:4. Similarly, Hu references “the IEEE

ports, or basic decision-making steps using measurable communication statistics.

Lavian, ¶¶31-42, 91, 95.

Claims 1-2, 4, 6-7, 11-12, 14 and 17 are therefore obvious over Blease in view of Weyman and Hu. Lavian, ¶¶85-159.

5. Claim Charts

'394	Blease (EX1005), Weyman (EX1006), Hu (EX1007)
1[pre⁵]. 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, ¶¶97-101. 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, ¶¶98-100. <i>E.g.</i> , Blease: <ul style="list-style-type: none">• Fig. 1

803.ad Standard” in its Background. Hu, 1:36-39. IEEE “803.ad” is likely a typographical error of IEEE 802.3ad, which is an earlier version of 802.1AX. *See, e.g.*, Lavian, ¶¶35-37.

⁵ The prior art discloses the preambles of the '394 claims, regardless of whether they are limiting.

'394

Blease (EX1005), Weyman (EX1006), Hu (EX1007)

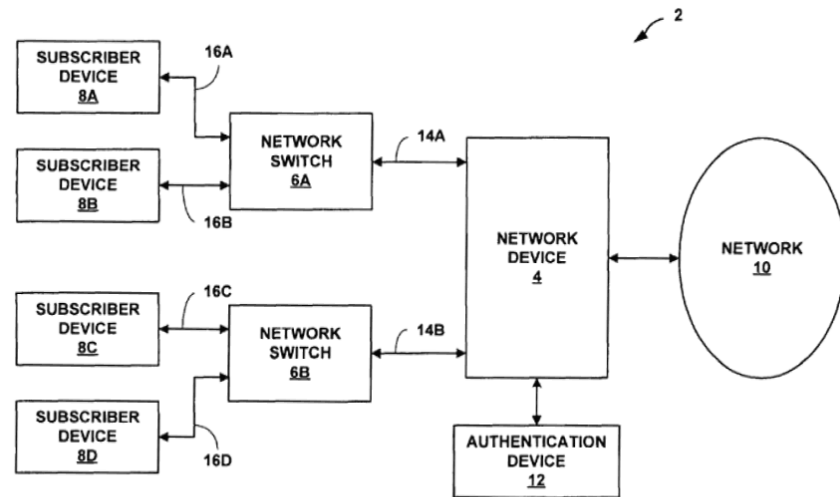


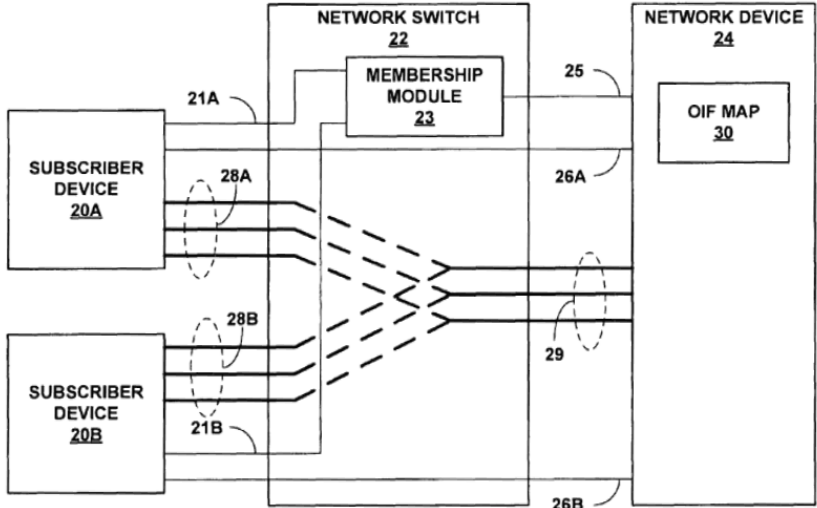
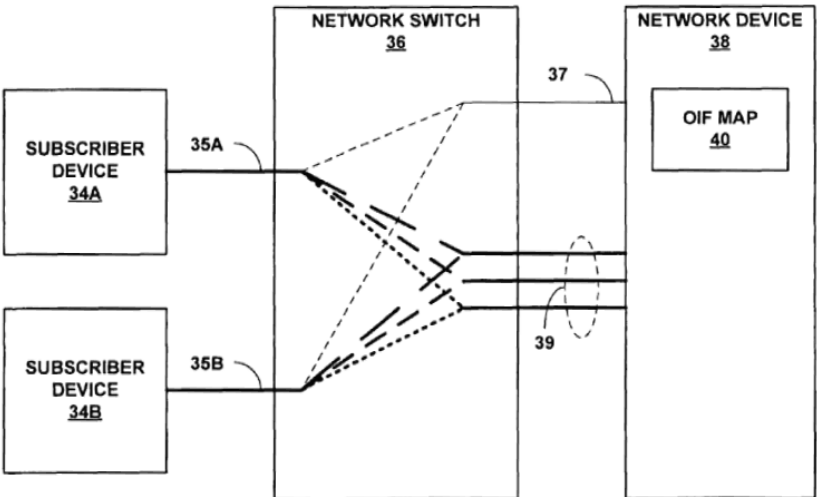
FIG. 1

- 3:34-58 (“FIG. 1 is a block diagram 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), Hu (EX1007)
	 <p data-bbox="544 861 625 892">FIG. 2</p> <ul data-bbox="527 913 665 955" style="list-style-type: none"> • Fig. 3  <p data-bbox="544 1585 625 1617">FIG. 3</p> <ul data-bbox="527 1648 1291 1732" style="list-style-type: none"> • See also 3:34-4:64 (describing Fig. 1), 4:65-7:3 (describing Fig. 2), 7:4-8:38 (describing Fig. 3).
1[a.i]. operating a network element,	Blease discloses operating a network element (e.g., operating router 42 to provide subscriber devices access to a network), wherein the network element further comprises

'394	Blease (EX1005), Weyman (EX1006), Hu (EX1007)
<p>wherein the network element further comprises multiple interconnected processing units and multiple ports,</p>	<p>multiple interconnected processing units (<i>e.g.</i>, router 42 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, ¶¶102-108.</p> <p>Regarding ports:</p> <p>Blease discloses that router 42, which is an example of network device 4/24/38 shown in Figs. 1-3 (<i>see</i> claim 1[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, ¶¶103-105.</p> <p>Regarding multiple interconnected processing units:</p> <p>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</p>

'394	Blease (EX1005), Weyman (EX1006), Hu (EX1007)
	<p>and handle packet transfers to/from a port and switch fabric). Lavian, ¶106.</p> <p>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.</p> <p>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.4, 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, ¶¶106-107. <i>E.g.</i>, Blease:</p> <ul style="list-style-type: none"> • 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

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Blease (EX1005), Weyman (EX1006), Hu (EX1007)

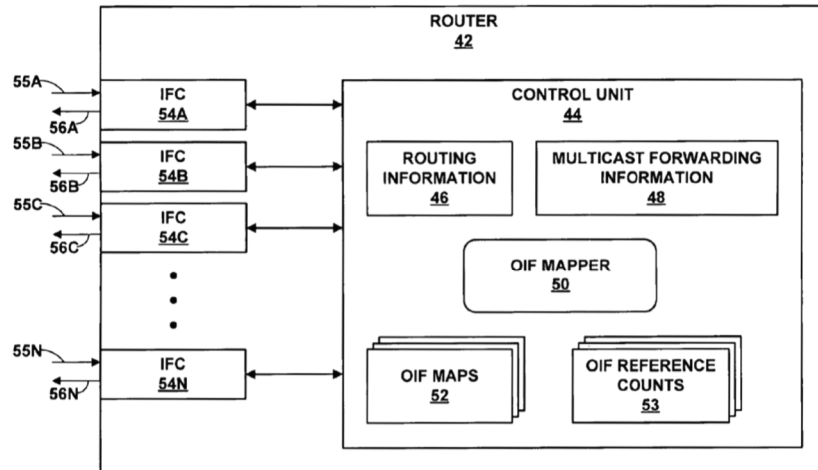


FIG. 4

- 3:65-4:9 (“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. Network device 4 maps the received membership request to an OIF dedicated to the requested multicast group. The first interface may be viewed as a mapping interface in that the first interface is configured to use an OIF map that maps membership requests received on the first interface to a dedicated OIF.”)
- 8:39-52 (“FIG. 4 is a block diagram illustrating an exemplary router 42 in accordance with an embodiment of the invention. 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. The subscriber devices may connect to router 42 via network switches.... In general, router 42 is capable of receiving membership

'394	Blease (EX1005), Weyman (EX1006), Hu (EX1007)
	<p><u>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.”)</u></p> <ul style="list-style-type: none"> <p>8:53-67 (“In the illustrated embodiment, <u>router 42 includes interface cards 54A-54N (“IFCs 54”) that receive packets on inbound links 55A-55N (“inbound links 55”) and send packets on outbound 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></p> <p>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</u></p>

'394	Blease (EX1005), Weyman (EX1006), Hu (EX1007)
	<p><u>network switch</u>. 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.”)</p> <ul style="list-style-type: none"> • 10:6-13 (“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. 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 (“In other embodiments, router 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.
<p>1[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</p>	<p>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, ¶¶109-111.</p> <p>As discussed for claim 1[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</p>

'394	Blease (EX1005), Weyman (EX1006), Hu (EX1007)
<p>subset of the multiple ports to which the processing unit is assigned;</p>	<p>subset of the links. Lavian, ¶110.</p> <p>Also discussed for claim 1[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, ¶111.</p> <p>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 54C is configured to communicate packets over inbound link 55C and outbound link 56C. Blease, Fig. 4. Lavian, ¶¶110-111.</p> <p><i>E.g.</i>, Blease:</p> <ul style="list-style-type: none"> • Fig. 4, 8:39-52, 8:53-67, 9:25-42, 10:6-13 (<i>see</i> claim 1[a.i]).
<p>1[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;</p>	<p>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, ¶¶112-115.</p> <p>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</p>

'394	Blease (EX1005), Weyman (EX1006), Hu (EX1007)
	<p>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, ¶¶113-114; <i>see also</i> Blease, 6:62-63, 8:29-30.</p> <p>As discussed for claim 1[a.i] and in §VII.A.4, 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, ¶113.</p> <p><i>E.g.</i>, Blease:</p> <ul style="list-style-type: none"> • 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</u>

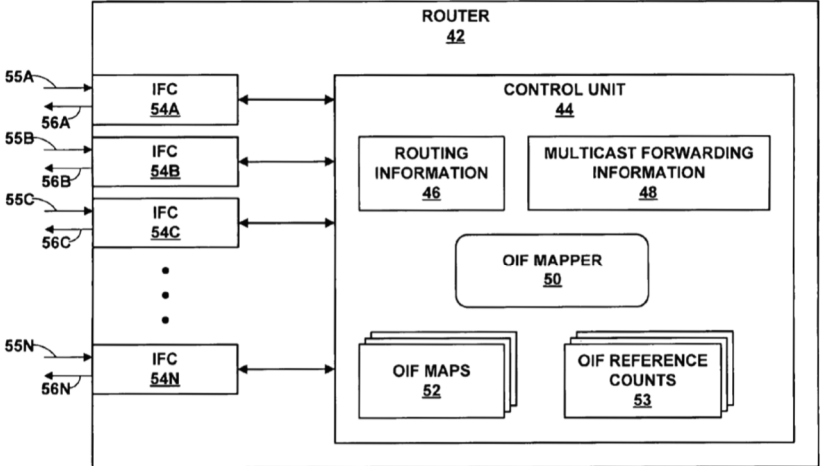
'394	Blease (EX1005), Weyman (EX1006), Hu (EX1007)
	<p><u>multicast group is currently forwarded to the network switch, i.e., whether another subscriber device connected to the same network switch is currently receiving the requested multicast stream.”)</u></p> <ul style="list-style-type: none"> • 14:50-57 (“<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 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 1[a.i]) • <i>See also</i> 11:5-17, 11:34-51.
<p>1[c]. receiving from a client a request relating to reception of a given multicast packet stream;</p>	<p>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, ¶¶116-118.</p> <p>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, ¶117.</p> <p><i>E.g.</i>, Blease:</p> <ul style="list-style-type: none"> • 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

'394	Blease (EX1005), Weyman (EX1006), Hu (EX1007)
	<p>receive packets on inbound links 55A-55N (“inbound links 55”) and send packets on outbound links 56A-56N (“outbound links 56”).... 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.”)</p> <ul style="list-style-type: none"> • 9:14-24 (“<u>For example, the subscriber device may comprise a set-top box for IPTV. In that case, the 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. In the case of an IPv6 network, the subscriber device may use the MLD protocol to signal a 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 (60).</u>”) • <i>See also</i> 1:48-61, 14:5-9, Fig. 6A (step 60).
<p>1[d]. distributing the request among the multiple processing units within the network element, and updating the</p>	<p>Blease in view of Weyman discloses distributing the request among the multiple processing units within the network element (e.g., 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 (e.g., the multicast forwarding information 48 is updated to include the</p>

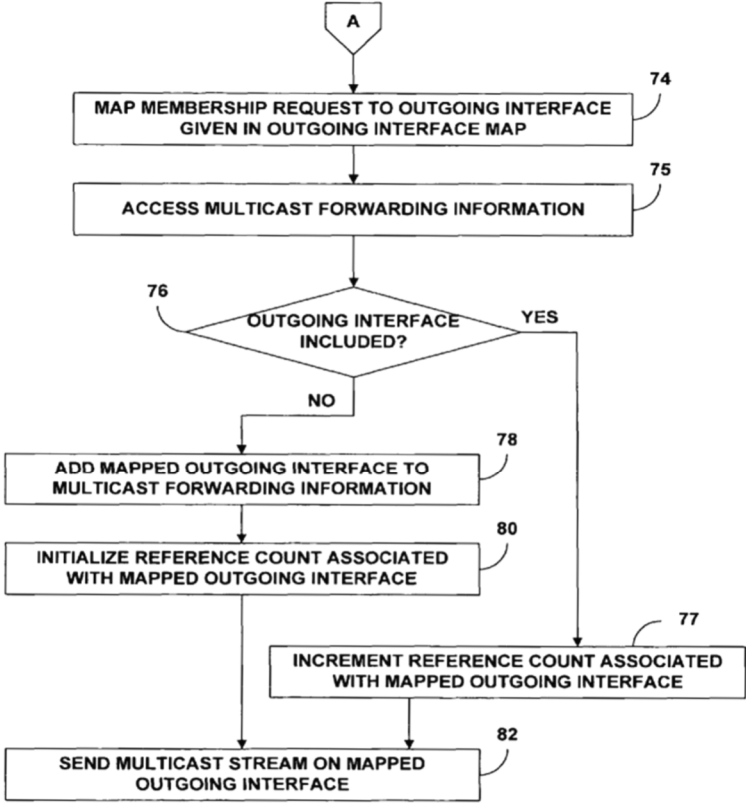
'394	Blease (EX1005), Weyman (EX1006), Hu (EX1007)
respective list in each processing unit responsively to the request; and	<p>identity of the interface that received the request). Lavian, ¶¶119-128.</p> <p>Blease discloses receiving the request at an IFC 54, as discussed for claim 1[c]. The request is then forwarded to control unit 44. Blease, 10:12-13. As discussed for claims 1[a.i] and 1[b], and in §VII.A.4, 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, Weyman explains that “one unit... process[es] the IGMP report [<i>i.e.</i>, the request⁶] 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, ¶120. 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 1[d]. Lavian, ¶121.</p> <p>(1) Request is distributed to each control unit for processing.</p> <p>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.</p> <p>For example, control unit 44 includes OIF mapper 50.</p>

⁶ See also the discussion of claims 6-7 below. For example, Blease discloses that “the request specifies a requested action... of receiving the given multicast packet stream” and “conforms to... an Internet Group Management Protocol.”

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	<p>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, ¶¶122-124.</p> <p>(2) Request is processed at one IFC and results are distributed to other IFCs.</p> <p>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 forwarding information 48 accordingly.</p> <p>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, ¶125.</p> <p>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, ¶¶126-127. 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:</p>

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	<p>“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>”</p> <p><i>E.g.</i>, Blease:</p> <p>Regarding control unit 44, including OIF mapper 50 and multicast forwarding information 48, distributed within IFCs 54:</p> <ul style="list-style-type: none"> Fig. 4  <p>FIG. 4</p> <ul style="list-style-type: none"> 11:54-57 (<i>see</i> claim 1[a.i]) <p>Regarding distributing requests to control unit 44 and processing requests:</p> <ul style="list-style-type: none"> 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, <u>network device 24 may send the requested multicast stream on an unmapped</u>

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	<p><u>OIF. The unmapped OIF may comprise the interface carrying the membership request.”)</u></p> <ul style="list-style-type: none"> • 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.... <u>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 multicast stream substantially similar to conventional transmission techniques.”)</u> • <i>See also</i> 8:29-38, 11:34-45.
<p>1[e]. selectively forwarding multicast packets associated with the given multicast packet stream by the processing units in accordance with the respective updated lists,</p>	<p>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, ¶¶129-131.</p> <p>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 1[d].</p> <p>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, ¶130.</p> <p><i>E.g., Blease:</i></p> <ul style="list-style-type: none"> • 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</u>

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	<p>multicast forwarding information 48.”)</p> <ul style="list-style-type: none"> 10:49-52 (“OIF mapper 50... accesses multicast forwarding information 48. Multicast forwarding information 48 controls replication and forwarding of multicast packets to subscriber devices.”) Fig. 6B (step 82)  <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> <p>FIG. 6B</p> <ul style="list-style-type: none"> 14:50-57 (“OIF mapper 50... pushes the multicast stream to the network switch over the mapped OIF (82)... Router 42 continues to send the multicast stream down the mapped OIF (82).”)
1[f]. wherein operating the network	Hu discloses that operating the network element comprises aggregating two or more of the ports to form a high-capacity port (e.g., aggregating physical ports 122 of

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element comprises aggregating two or more of the ports to form a high-capacity port, and	<p>switch 102 to form high-bandwidth link aggregation group (LAG) 124). Lavian, ¶¶132-134.</p> <p>In addition to Blease's disclosure that a network switch may aggregate its outputs into a higher-speed link to a network device (<i>e.g.</i>, to router 42) (<i>see</i> Blease, 4:24-27), Hu teaches aggregating ports 122, 126 of a switch to form LAGs 124, 128 that each provide high-bandwidth links. Hu, 3:10-32. A POSA would have been motivated to modify Blease to include aggregated ports in or among links 55A-55N and 56A-56N to, <i>e.g.</i>, form high-bandwidth links and provide the ability to balance packets among aggregated ports, as discussed in §VII.A.4. Lavian, ¶133.</p> <p><i>E.g.</i>, Hu:</p> <ul style="list-style-type: none">• Fig. 1

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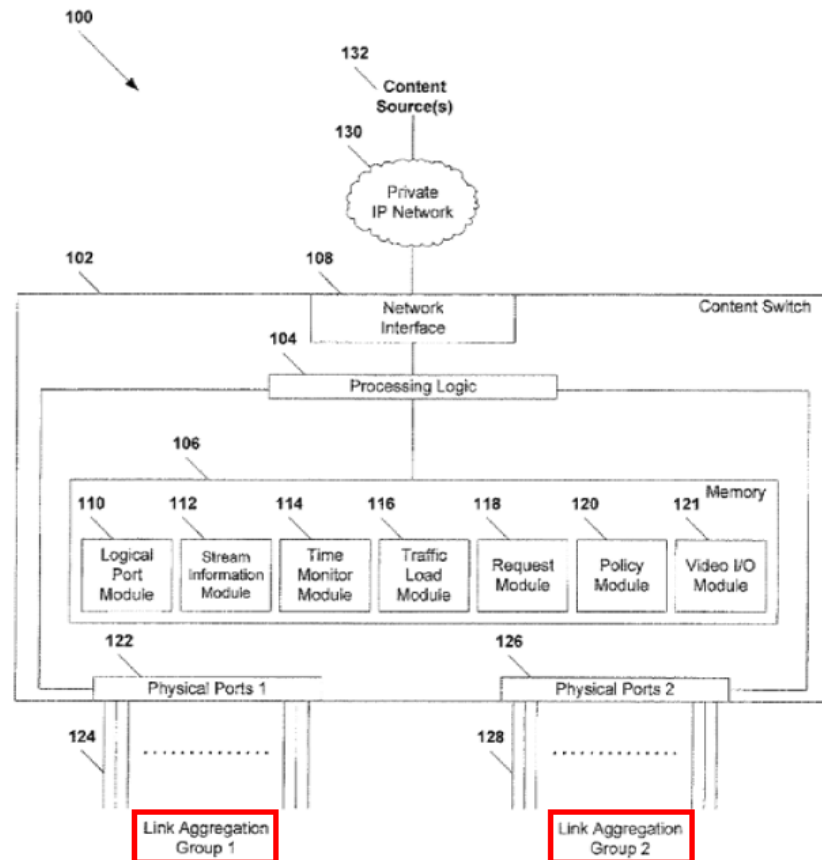


FIG. 1

- 3:10-32 (“Further, the content switch 102 can include a network interface 108 to communicate with the private IP network 130. In addition, the content switch 102 includes multiple physical ports, which may be logically grouped as illustrated by a first plurality of physical ports 122 and a second plurality of physical ports 126. Each plurality of physical ports 122, 126 is associated with a link aggregation group and can be treated by the content switch 102 as a single logical port or other logical channel. In general, 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 link

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	<p><u>aggregation group 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.</u></p> <p><u>For example, the first plurality of physical ports 122 can be associated with a first link aggregation group 124 and can be treated by the content switch 102 as a first logical port. Similarly, the second plurality of physical ports 126 can be associated with a second link aggregation group 128 and can be treated by the content switch 102 as a second logical port.”)</u></p> <ul style="list-style-type: none"> • <i>See also</i> 1:30-39.
<p>1[g.i]. wherein aggregating the ports comprises setting an upper limit on a number of the multicast packet streams that are permitted for forwarding over the high- capacity port,</p>	<p>Hu discloses that aggregating the ports (<i>e.g.</i>, aggregating ports into LAGs) comprises setting an upper limit on a number of the multicast packet streams that are permitted for forwarding over the high-capacity port (<i>e.g.</i>, setting a pre-defined threshold for video traffic loads to limit the number of multicast packet streams). Lavian, ¶¶135-140.</p> <p>In addition to the disclosure of Blease in view of Hu—of aggregating ports to form a high-bandwidth port as discussed for claim 1[f]—Hu teaches aggregating ports and responding to requests for streams using a pre-defined threshold for video traffic loads. Hu, 3:10-32, 5:13-22. 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 set an upper limit for streams on the aggregated ports, as taught by Hu, to, <i>e.g.</i>, ensure that a certain quality of service is maintained, as discussed in §VII.A.4. Lavian, ¶136.</p>

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	<p>Additionally, PO appears to assert that the broad concept of load-balancing satisfies this limitation limiting the number of multicast streams over the high-capacity port. EX1013, 17-18.⁷ 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 "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, 137-139.</p> <p><i>E.g.</i>, Hu:</p> <ul style="list-style-type: none">• 3:10-32 (<i>see</i> claim 1[f])• 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

⁷ 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).

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	<p>processing logic 104 to reject the request for the video stream.”)</p> <ul style="list-style-type: none"> 6:39-7:8 (“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. <u>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> <p>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 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. Whereas, if the total traffic load meets or exceeds the pre-defined threshold, the method proceeds to decision node 216.</u></p> <p><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</u></p>

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	<p>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.</u> The method terminates at 220.”)</p> <ul style="list-style-type: none"> • 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>”) • <i>See also</i> 5:30-6:3.
<p>1[g.ii]. wherein the request indicates that the given multicast packet stream is to be forwarded over the high-capacity port, and</p>	<p>Blease in view of Hu discloses that the request indicates that the given multicast packet stream is to be forwarded over the high-capacity port. Lavian, ¶¶141-143.</p> <p>As discussed for claims 1[c]-1[e], Blease discloses that the request indicates that the port on which the request is received is the port for forwarding the multicast packet stream. And, as discussed for claim 1[f], a POSA would have been motivated to modify Blease to aggregate two or more links to form a high-bandwidth port for forwarding packets.</p> <p>Accordingly, Blease in view of Hu discloses that the request indicates that the given multicast packet stream is to be forwarded over the high-capacity port when the request is received over the high-bandwidth link. <i>See also</i> Hu, 4:14-30, 4:31-40, and 6:10-7:8 (describing reception of a request on a link of a LAG indicating that the LAG will be used for forwarding streams). Lavian, ¶142.</p>
<p>1[g.iii]. wherein updating the list comprises modifying the list to indicate that the given multicast packet stream is permitted for</p>	<p>Blease in view of Weyman and Hu discloses that updating the list comprises modifying the list to indicate that the given multicast packet stream is permitted for forwarding over the high-capacity port.</p> <p>As discussed for claims 1[d] and 1[g.ii], Blease in view of Weyman and Hu discloses that the request indicates that the multicast packet stream is to be forwarded over the high-bandwidth link, and further updating the list responsively to the request. And, as discussed for claim 1[g.i], Blease in</p>

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<p>forwarding over the high-capacity port only when the number of the multicast packet streams that are permitted for forwarding over the high-capacity port, including the given multicast packet stream, does not exceed the upper limit.</p>	<p>view of Hu discloses setting the upper limit for streams permitted on the high-bandwidth link. Lavian, ¶¶144-145.</p> <p>Hu teaches that the given multicast packet stream is permitted for forwarding over the high-capacity port only when the number of the multicast packet streams that are permitted for forwarding over the high-capacity port, including the given multicast packet stream, does not exceed the upper limit (<i>e.g.</i>, if the traffic load at the LAG can take on the new request without exceeding the pre-defined threshold, then the request is assigned to the LAG).</p> <p>In addition to Blease's disclosure of updating the multicast forwarding information 48 to map a request, as discussed for claim 1[d], Hu teaches that, responsive to a request, requests will only be granted, and streams will only be forwarded on the LAG, if the 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. 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.4. Lavian, ¶¶144-146.</p> <p><i>E.g.</i>, Hu:</p> <ul style="list-style-type: none"> • 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. If not, 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. Otherwise, the request module 118 can be executable by the processing</u>

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	<p>logic 104 to reject the request for the video stream.”)</p> <ul style="list-style-type: none"> <p>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 that the video traffic load at the port does not exceed the threshold after the new video stream is added at the port.</u> 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. <u>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>”)</p> <p>6:26-38 (“<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> For instance, where the measured video traffic load at each physical port includes a particular bit rate, the particular bit rate can be increased by a bit rate associated with each join message affecting data sent via the port since the most recent time measurement point and can be decreased by a bit rate associated with each leave message affecting data sent via the port since the most recent time measurement point.”)</p> <p>6:39-7:8 (“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. <u>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</u></p>

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	<p><u>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></p> <p>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 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.</p> <p><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.”)</p>
2. The method	Blease discloses that storing the list, distributing the request and selectively forwarding the multicast packets

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<p>according to claim 1, wherein storing the list, distributing the request and selectively forwarding the multicast packets are performed by dedicated hardware logic.</p>	<p>are performed by dedicated hardware logic (<i>e.g.</i>, performed by control unit 44 implemented solely as hardware). Lavian, ¶¶148-151.</p> <p>Blease discloses that steps including storing the list (<i>e.g.</i>, maintaining multicast forwarding information 48, <i>see</i> claim 1[b]), distributing the request (<i>e.g.</i>, distributing the request to control units 44 in IFCs 54 and/or distributing request analysis results to IFCs 54, <i>see</i> claim 1[d]), and the selectively forwarding of multicast packets (<i>e.g.</i>, forwarding packets in accordance with multicast forwarding information 48, <i>see</i> claim 1[e]) are performed by control unit 44, which includes OIF mapper 50 and multicast forwarding information 48. <i>See, e.g.</i>, Blease, Fig. 4, 8:64-67, 9:43-53, 10:49-61, and discussions of claims 1[b], 1[d], and 1[e]. Lavian, ¶149.</p> <p>Blease further discloses that control unit 44 is “solely... hardware”—<i>i.e.</i>, dedicated hardware logic. Blease, 11:63-12:3. Lavian, ¶150.</p> <p><i>E.g.</i>, Blease:</p> <ul style="list-style-type: none"> • 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.</u> 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.”)
<p>4. The method according to claim 1, wherein distributing the request comprises distributing</p>	<p>Blease in view of Weyman discloses that distributing the request comprises distributing among the multiple processing units an identity of an ingress port over which the request was received at the network element, and wherein updating the list comprises causing the list to indicate that the given multicast packet stream is permitted for forwarding over the ingress port. Lavian,</p>

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among the multiple processing units an identity of an ingress port over which the request was received at the network element, and wherein updating the list comprises causing the list to indicate that the given multicast packet stream is permitted for forwarding over the ingress port.	<p>¶¶152-153.</p> <p>As discussed for claim 1[d], Blease in view of Weyman discloses that distributing the request and updating the list responsive to the request results in updating multicast forwarding information 48 in each IFC 54 to include the identity of the interface that received the request—<i>i.e.</i>, the ingress port over which the request was received at router 42. <i>See, e.g.</i>, Blease, 6:62-7:3, 14:10-20. Accordingly, the information distributed from the receiving IFC 54 identifies the ingress port over which the request was received for adding to multicast forwarding information 48. Lavian, ¶153.</p>
<p>6.</p> <p>The method according to claim 1, wherein the request specifies a requested action selected from a group of actions consisting of receiving the given multicast packet stream and stopping to receive the given multicast packet stream.</p>	<p>Blease discloses that the request specifies a requested action selected from a group of actions consisting of receiving the given multicast packet stream (<i>e.g.</i>, requesting membership to receive multicast traffic) and stopping to receive the given multicast packet stream (<i>e.g.</i>, requesting to leave a multicast group and no longer receive multicast traffic). Lavian, ¶¶154-156.</p> <p><i>E.g.</i>, Blease:</p> <ul style="list-style-type: none"> • 5:38-50 (“<u>In order to receive multicast traffic, subscriber devices 20 send membership requests for specific membership groups to network device 24 via network switch 22.</u> In the illustrated embodiment, subscriber devices 20 <u>use the IGMP to signal the membership requests to network device 24.</u> In the case of an IPv6 network, subscriber devices 20 <u>use the MLD protocol to signal membership requests to network device 24.</u> <u>Subscriber devices 20 send the membership requests to network switch 22 on IGMP interfaces 21A and 21B (“IGMP interfaces 21”).</u> In addition, when

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	<p><u>subscriber interfaces 20 no longer want to receive multicast traffic associated with a specific multicast group, subscriber devices 20 send leave requests for the multicast group on IGMP interfaces 21.”)</u></p> <ul style="list-style-type: none"> • <i>See also</i> 3:58-64, 7:41-53, 10:6-13, 14:3-9.
<p>7. The method according to claim 1, wherein the request conforms to one of an Internet Group Management Protocol (IGMP) and a Multicast Listener Discovery (MLD) protocol.</p>	<p>Blease discloses that the request conforms to one of an Internet Group Management Protocol (IGMP) and a Multicast Listener Discovery (MLD) protocol (<i>e.g.</i>, the requests use the IGMP or MLD protocol). Lavian, ¶¶157-159.</p> <p><i>E.g.</i>, Blease:</p> <ul style="list-style-type: none"> • 5:38-50 (<i>see</i> claim 6) • <i>See also</i> 3:58-64, 7:41-53, 10:6-13, 14:3-9.
<p>11[pre]. A network element, comprising;</p>	<p><i>See</i> claim 1[a.i].</p>
<p>11[a]. multiple ports; and</p>	<p><i>See</i> claim 1[a.i].</p>
<p>11[b.i]. multiple interconnected processing units,</p>	<p><i>See</i> claim 1[a.i].</p>
<p>11[b.ii]. wherein each processing unit is assigned to a different subset of</p>	<p><i>See</i> claim 1[a.ii].</p>

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the multiple ports of the network element, and	
11[b.iii] 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,	<i>See claim 1[a.ii].</i>
11[b.iv] wherein the processing units are configured to process packets that are communicated over respective subsets of one or more of the ports,	<i>See claims 1[a.ii], 2 (describing logic for performing functions).</i>
11[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	<i>See claims 1[b], 2.</i>

'394	Blease (EX1005), Weyman (EX1006), Hu (EX1007)
indicates which of the one or more ports multicast packet stream is permitted to be forwarded to,	
11[b.vi] to receive from a client a request relating to reception of a given multicast packet stream, and	<i>See</i> claims 1[c], 2.
11[b.vii.α] 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</i> claims 1[d], 2.
11[b.vii.β] to selectively forward multicast packets associated with the given multicast packet stream in accordance with the updated lists,	<i>See</i> claims 1[e], 2.
11[c.i] wherein two or	<i>See</i> claim 1[f].

'394	Blease (EX1005), Weyman (EX1006), Hu (EX1007)
more of the ports are aggregated to form a high-capacity port, and	
11[c.ii] wherein an upper limit is set on a number of the multicast packet streams that are permitted for forwarding over the high-capacity port,	<i>See</i> claim 1[g.i].
11[c.iii] wherein the request indicates that the given multicast packet stream is to be forwarded over the high-capacity port, and	<i>See</i> claim 1[g.ii].
11[c.iv] wherein the processing units are configured to update the lists to indicate that the given multicast packet stream is permitted for forwarding over the high-capacity port only when the number of the multicast packet streams that are	<i>See</i> claim 1[g.iii].

'394	Blease (EX1005), Weyman (EX1006), Hu (EX1007)
permitted for forwarding over the high-capacity port, including the given multicast packet stream, does not exceed the upper limit.	
12. The network element according to claim 11, wherein the processing units comprise dedicated hardware logic for storing the lists, distributing the request and selectively forwarding the multicast packets.	<i>See claim 2.</i>
14. The network element according to claim 11, wherein a processing unit receiving the request is configured to distribute among the multiple processing units an identity of an ingress port over	<i>See claim 4.</i>

'394	Blease (EX1005), Weyman (EX1006), Hu (EX1007)
which the request was received, and wherein the processing units are configured to cause the respective lists to indicate that the given multicast packet stream is permitted for forwarding over the ingress port.	
17. The network element according to claim 11, wherein the request conforms to one of an Internet Group Management Protocol (IGMP) and a Multicast Listener Discovery (MLD) protocol.	See claim 7.

B. Ground 2: Claim 16 is Obvious Over Blease in view of Weyman, Hu, and Deng

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

Blease in view of Weyman and Hu discloses the network element of claim

11. *See* §VII.A. Claim 16 of the '394 depends from claim 11 and recites:

[16[a.i]] wherein the processing units are configured to track 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 [16[a.ii]] to remove the permission from the respective lists responsively to determining that the permission is aged.

Blease in view of Weyman, Hu, and Deng discloses claim 16. Lavian, ¶¶160-168.

As discussed for claim 1[g.i] above, Blease in view of Weyman and Hu discloses setting an upper limit on a number of multicast packet streams that are permitted for forwarding over a high-capacity port. Hu's teachings track limits and determine whether limits will be exceeded by new requests by tracking multicast packet streams already permitted on a high-capacity port and determining "whether an existing 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." Hu, 5:44-56, 6:65-7:8. Hu therefore teaches claim 16[a.i]. Lavian, ¶¶163, 167.

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, ¶¶163, 167.

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

Blease, Weyman, Hu, and Deng are in the same field as the ’394—*e.g.*, computer and networking technology. *See* §VII.A.4; Deng, [0002] (relating to network switches and multicasting). Lavian, ¶162.

As explained above, Blease in view of Weyman and Hu discloses setting an upper limit on a number of multicast packet streams and tracking use of permitted streams over a high-capacity port by monitoring multicast group requests and determining if requests will exceed pre-defined limits—and maintaining limits by potentially dropping existing streams. Hu’s teachings “may compare statistics to various statistical thresholds” but otherwise leaves to the POSA what statistics or

conditions to monitor for dropping existing streams. Hu, 5:14-30. Deng teaches use of a particular policy to automatically drop streams: to track multicast addresses and remove them after expiration of a timer, as discussed above. A POSA would have been motivated to modify Blease, Weyman, and Hu to track requests and forwarded multicast streams based on a timer, and to automatically drop streams after a period of time or identify streams available for dropping—*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, ¶163.

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 and Hu, limits are 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, Weyman, and Hu 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, ¶164.

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*^[8] if there is compelling evidence of unpatentability”^[9]—which this Petition provides. That should conclude the *Fintiv*

⁸ *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (Mar. 20, 2020) (precedential).

⁹ *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

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.

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 1-2, 4, 6-7, 11-12, 14, and 16-17 of the ’394, claims 1 and 11 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, 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, 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, Li¹⁰, Jain¹¹, Rooholamini¹², Pitcher¹³, LeMaire¹⁴, and Ding¹⁵, which are unrelated to Blease, Hu, and Deng applied herein. While Weyman is present in both the Cisco IPR petition (as a primary

¹⁰ W.O. 2007/140702

¹¹ U.S. 2006/0224877

¹² U.S. 2007/0297406

¹³ U.S. 6,370,142

¹⁴ U.S. 5,999,530

¹⁵ U.S. 2006/0146823

reference) and this Petition (as a secondary reference), the Cisco IPR petition does not discuss or apply Weyman in combination with any of Blease, 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 (*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*¹⁶ factors, finding no significant relationship between parties having different accused products that merely engage in court-ordered pretrial coordination).

¹⁶ *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)

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 Naik¹⁷, Reader¹⁸, Deng-272¹⁹, Hu²⁰, Ramanathan²¹, and Schuler²². Naik, Reader, Ramanathan, and Schuler are unrelated to Blease, Weyman and Hu applied herein. Furthermore, primary prior art Naik and prior art similar to secondary prior art Deng-272²³ were previously applied during the original prosecution of the '394 (*see* §V.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. 2006/0146857

¹⁸ U.S. 2005/008901

¹⁹ U.S. 2005/0232272

²⁰ U.S. 8,068,416 (EX1007)

²¹ U.S. 2009/0279549

²² U.S. 7,174,390

²³ 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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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 13,806 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. Petitioner has 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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