
Cisco Systems, Inc.
v. Corrigent Corporation

Patent Owner Corrigent's Presentation
Inter Partes Review of U.S. Patent No. 9,118,602
IPR2023-00447

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Step toe

Roadmap

- *Ground 1 – Raz*
 - Raz fails to disclose or render obvious the claimed “LAG”
 - Raz fails to disclose or render obvious a first MPLS/LAG switch assigning, encoding, and then “sending ... via” a single physical tunnel port
 - POSA would not modify Raz to apply between two MPLS/LAG switches, let alone to arrive at the claimed invention
 - There is no reasonable expectation of success
 - Raz fails to disclose or render obvious claim 15’s “mapper”

- *Ground 2 – Raz in view of Ferguson*
 - Ground 2 does not cure the problems with Ground 1
 - POSA would not modify Raz based on Ferguson
 - There is no reasonable expectation of success

Recurring Problems with Petitioner's Reply

- New Reply Theories:
 - LAGs were “well-known”
 - Raz’s single high-speed link between LSRs was merely a “design choice”
 - Raz’s single high-speed link between LSRs had “bandwidth limitations”
 - LAG was an obvious “alternative” to Raz’s single high-speed link to “increase” link bandwidth between LSRs
 - Raz’s subports “function[]” like a LAG
 - The claim requirement that the single physical tunnel port for sending a packet between MPLS/LAG switches is assigned by the first switch was a “design choice”
 - The “same subport number” could be used by consecutive pairs of Raz’s LSRs
 - Raz’s subport forwarding module renders obvious limitations 15.6–15.8
 - Reasonable expectations of success
- Improper Reliance on Mere “Design Choice”:
 - Raz’s single high-speed link was a “design choice”
 - The claim requirement that the single physical tunnel port for sending a packet between MPLS/LAG switches is assigned by the first switch was a “design choice”
 - Raz’s multiplexing was a “design choice”

IPR2023-00447 – See Sur-Reply, pp. 1-8, 11-12, 14-17, 19, 21-23, 25

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Petitioner's New Reply Declaration

- Petitioner's original declaration:
 - *claims 1 & 15 (Ground 1)*= 39 pages
 - *limitation 1.5*= 1½ pages
- Petitioner's new Reply declaration:
 - *claims 1 & 15 (Ground 1)*= 55 pages
 - *limitation 1.5*= 10 pages

Overview of the '602 Patent

IPR2023-00447 – See POR, pp. 2-4, 6-7, 9-10, 13-14, 25, 39; Sur-Reply, pp. 8-9

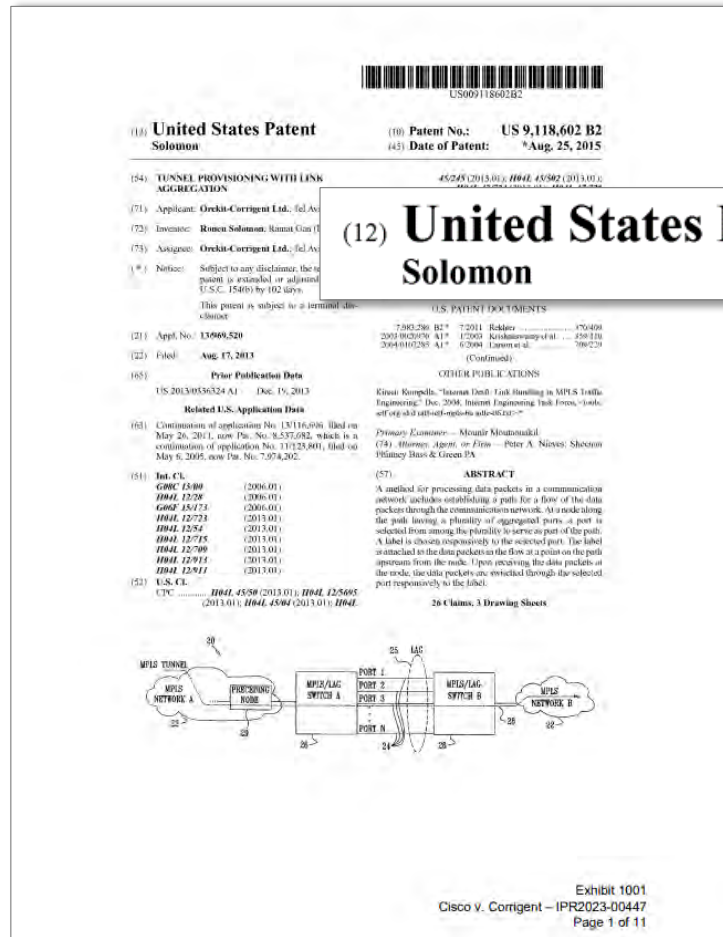
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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Cisco v. Corrigent - IPR2023-00447
Patent Owner Corrigent Exhibit 2013-0005

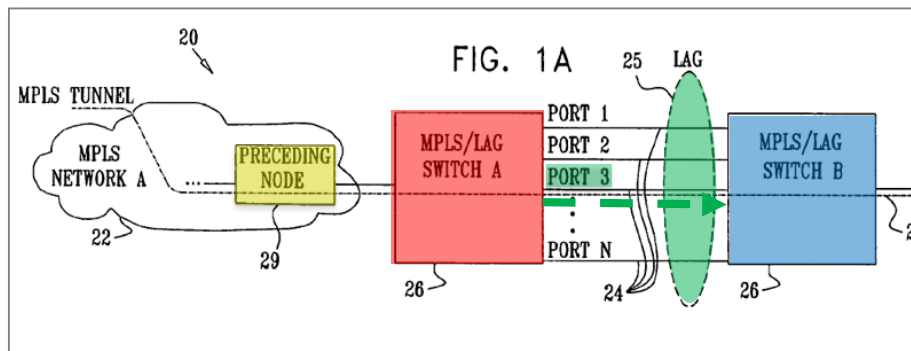
U.S. Patent No. 9,118,602



IPR2023-00447 – '602 Patent (Ex. 1001), p. 1

Steptoe

'602 Patent



What is claimed is:

1. A method for assigning and utilizing an Ethernet physical data port in an Ethernet Link Aggregation Group (LAG) in a Multi-Protocol Label Switching (MPLS) network, the method comprising the steps of:

assigning, by a first MPLS/LAG switch, a single physical tunnel port of a LAG to a network tunnel, wherein the single physical tunnel port of the LAG meets a bandwidth requirement of the network tunnel, and wherein said single physical tunnel port of the LAG has a port serial number;

dedicating a sub-set of bits in a data packet label prepared by the first MPLS/LAG switch to encode said port serial number of said single physical tunnel port of the LAG into the data packet label;

sending, by said first MPLS/LAG switch, the data packet label, in which said port serial number of said single physical tunnel port is encoded, to a preceding node;

receiving from the preceding node, by said first MPLS/LAG switch, a data packet comprising said data packet label, in which said port serial number of said single physical tunnel port is encoded; and

sending said data packet from said first MPLS/LAG switch to a second MPLS/LAG switch via said single physical tunnel port having the port serial number encoded in the data packet label.

IPR2023-00447 – '602 Patent (Ex. 1001) at Fig. 1A, claim 1

IPR2023-00447 – See POR, pp. 2-4, 6-7, 9-10, 13-14, 25, 39; Sur-Reply, pp. 8-9

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Ground 1 (Raz):

Overview of Raz

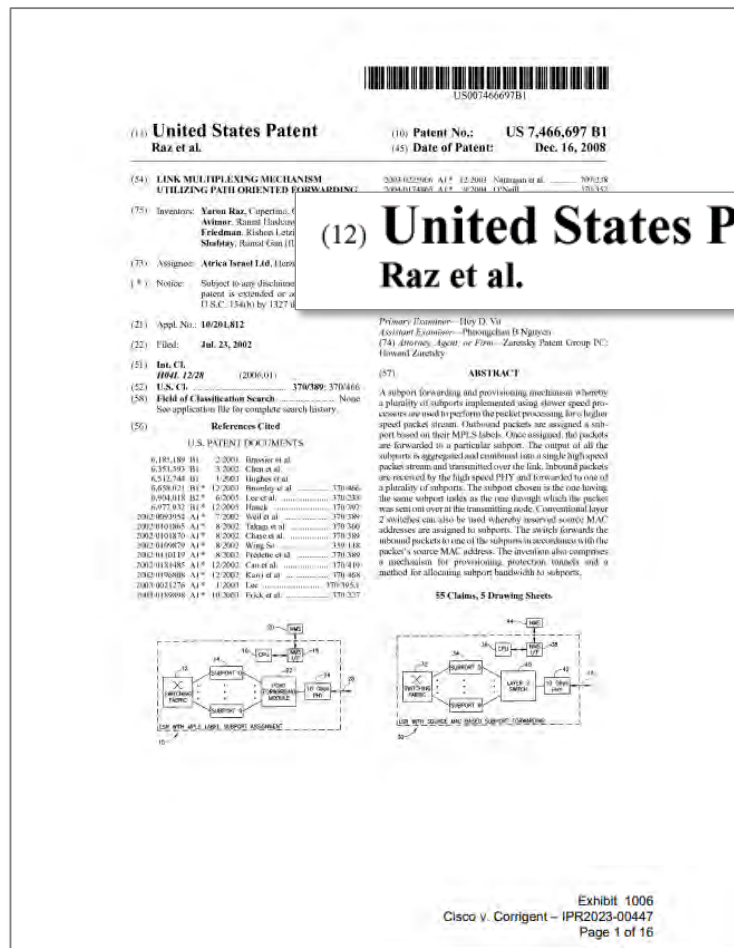
IPR2023-00447 – See POR, pp. 7-16, 18-19, 26-33, 39-42; Sur-Reply, pp. 2, 4-5, 9-10, 12-14

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

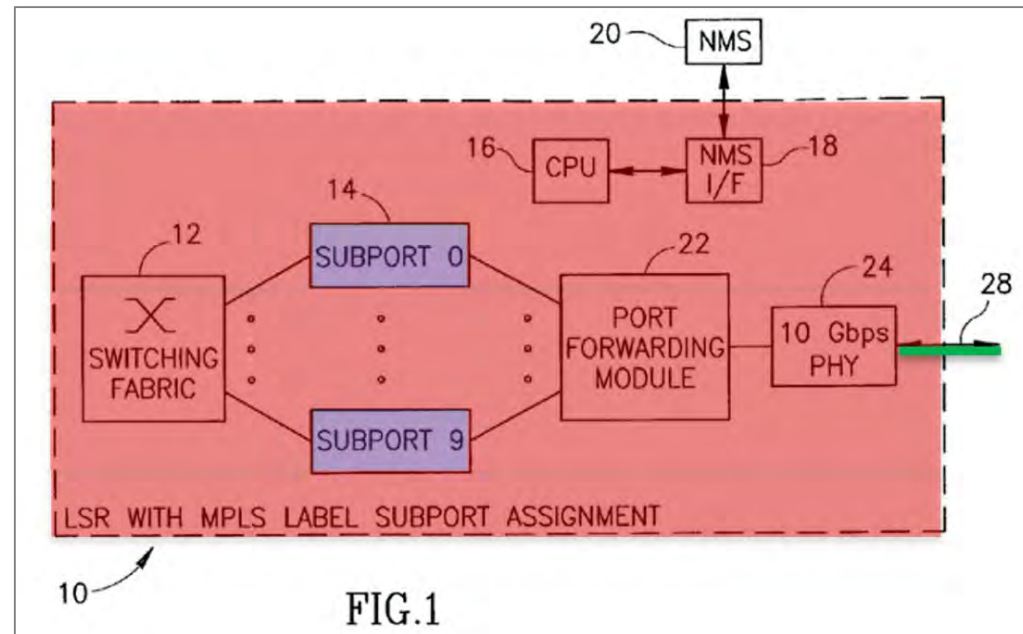
Raz



IPR2023-00447 – Raz (Ex. 1006), p. 1

Steptoe

Overview of Raz



IPR2023-00447 – Raz (Ex. 1006) at Fig. 1

IPR2023-00447 – See POR, pp. 7-16, 18-19, 26-33, 39-42; Sur-Reply, pp. 2, 4-5, 9-10, 12-14

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Overview of Raz

BACKGROUND OF THE INVENTION

There is thus a need for a forwarding and provisioning mechanism that enables a high speed packet stream to be processed by multiple processors that operate at a slower rate than the inbound packet stream. The mechanism should be

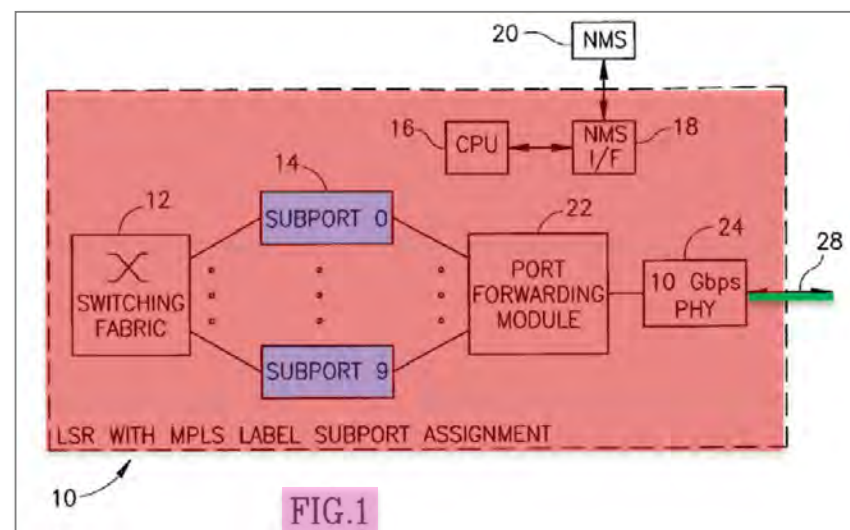
SUMMARY OF THE INVENTION

The present invention provides a link multiplexing mechanism utilizing path oriented forwarding. The mechanism comprises a subport forwarding and provisioning mechanism whereby a plurality of subports comprising slower speed processors are used to perform the packet processing for a higher speed packet stream. To provide the flexibility

DETAILED DESCRIPTION OF THE INVENTION

The present invention provides a subport forwarding and provisioning mechanism whereby a plurality of subports comprising slower speed processors are used to perform the packet processing for a higher speed packet stream. To pro-

particular subport. The output of all the subports is aggregated and combined into a single high-speed packet stream and transmitted over the link. Inbound packets are received by the



ABSTRACT

A subport forwarding and provisioning mechanism whereby a plurality of subports implemented using slower speed processors are used to perform the packet processing for a higher speed packet stream. Outbound packets are assigned a subport based on their MPLS labels. Once assigned, the packets are forwarded to a particular subport. The output of all the subports is aggregated and combined into a single high speed packet stream and transmitted over the link. Inbound packets

IPR2023-00447 – Raz (Ex. 1006) at 1:56-59, 1:65-2:3, 6:24-27, 6:36-38, Fig. 1, Abstract

IPR2023-00447 – See POR, pp. 7-16, 18-19, 26-33, 39-42; Sur-Reply, pp. 2, 4-5, 9-10, 12-14

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Ground 1 (Raz):

- *Roadmap for Ground 1*

- Raz fails to disclose or render obvious the claimed “LAG”
- Raz fails to disclose or render obvious a first MPLS/LAG switch assigning, encoding, and then “sending ... via” a single physical tunnel port
- POSA would not modify Raz to apply between two MPLS/LAG switches, let alone to arrive at the claimed invention
- There is no reasonable expectation of success
- Raz fails to disclose or render obvious claim 15’s “mapper”

Ground 1 (Raz):

Raz Does Not Disclose or Render Obvious the Claimed “LAG”

IPR2023-00447 – See POR, pp. 2-4, 6-9, 12-16, 18, 20, 25-29; Sur-Reply, pp. 2-8, 14-19

Steptoe

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

'602 Patent Claims Require a “LAG” Between Two MPLS/LAG Switches

What is claimed is:

1. A method for assigning and utilizing an Ethernet physical data port in an Ethernet Link Aggregation Group (LAG) in a Multi-Protocol Label Switching (MPLS) network, the method comprising the steps of:

assigning, by a first MPLS/LAG switch, a single physical tunnel port of a LAG to a network tunnel, wherein the single physical tunnel port of the LAG meets a bandwidth requirement of the network tunnel, and wherein said single physical tunnel port of the LAG has a port serial number;

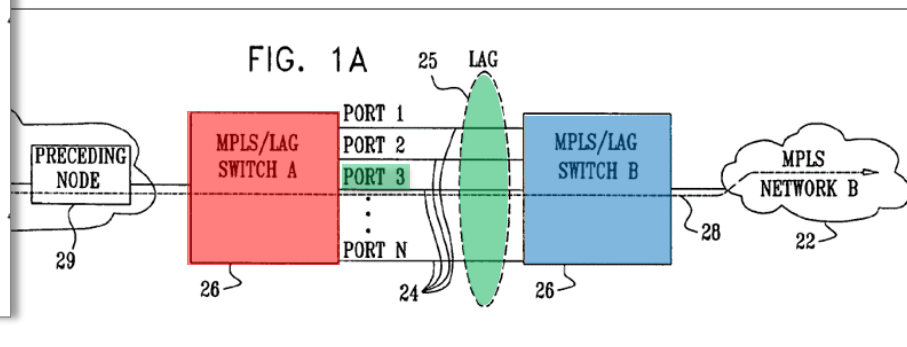
dedicating a sub-set of bits in a data packet label prepared by the first MPLS/LAG switch to encode said port serial number of said single physical tunnel port of the LAG into the data packet label;

sending, by said first MPLS/LAG switch, the data packet label, in which said port serial number of said single physical tunnel port is encoded, to a preceding node;

receiving from the preceding node, by said first MPLS/LAG switch, a data packet comprising said data packet label, in which said port serial number of said single physical tunnel port is encoded; and

sending said data packet from said first MPLS/LAG switch to a second MPLS/LAG switch via said single physical tunnel port having the port serial number encoded in the data packet label.

IPR2023-00447 – '602 Patent (Ex. 1001) at claim 1, Fig. 1A



Raz's Subports Do Not Disclose or Render Obvious a LAG

- The Petition argued that Raz's **subports** teach the LAG (link aggregation group)

Figure 1 of Raz (shown below) provides an example of ten subports (Subport 0-Subport 9) used to implement link aggregation within an LSR in an MPLS

POSA would have understood that Raz discloses Ethernet subports in an Ethernet LAG. EX1004, ¶¶81-82.

While Raz discusses the utilization of subports in a LAG within a LSR to

Raz teaches the assignment of one subport of a LAG to a LSP within a LSR

see id., Cols. 7:30-38 (providing example in which the assignment of subport 3 of a LAG to a network tunnel is performed by LSR B), 7:11-14, 9:41-48; EX1004, ¶86.

As discussed above for Element [1.2], Raz discloses encoding the serial number of a physical tunnel subport of the LAG into the label. EX1004, ¶98. Further,

POSA would have understood that the data packet in LSR B could be sent to another LSR (which would correspond to the claimed second MPLS/LAG switch) via a physical tunnel subport (subport 3) having the port serial number encoded in the data

IPR2023-00447 –
Petition, pp. 14-17,
23, 25

IPR2023-00447 – See POR, p. 25; Sur-Reply, pp. 2-4, 7-8, 18

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Raz's Subports Do Not Disclose or Render Obvious a LAG

- The Institution Decision recognizes the Petition's reliance on Raz's **subports** as the LAG

Limitation 1.0:

Petitioner contends that “[w]hile Raz discusses the utilization of subports in a LAG within a LSR to communicate high-speed packet streams

Limitation 1.1:

Petitioner contends Raz teaches the assignment of one subport of a LAG to a LSP within a LSR to communicate packets in a high-speed packet

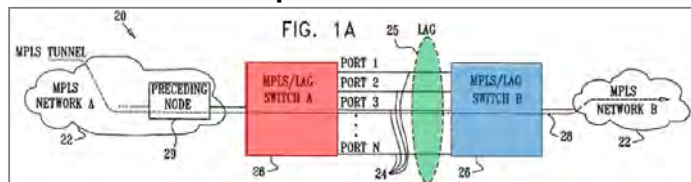
Limitation 1.2:

Petitioner contends “Raz discusses dedicating a sub-set of bits in MPLS label 140 (i.e. a data packet label) prepared by an LSR to encode the subport serial number of a physical subport of the LAG into the label.”

IPR2023-00447 – Institution Decision (Paper 8), pp. 7-8

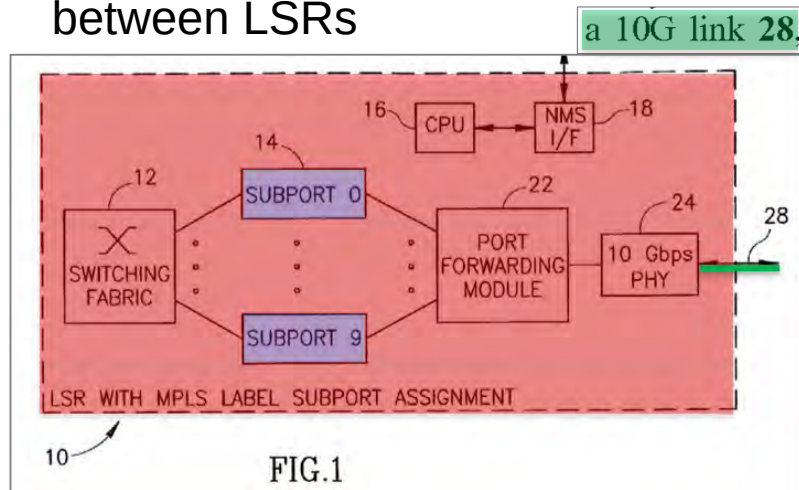
Raz's Subports Do Not Disclose or Render Obvious a LAG

- A **LAG** is multiple *links* that are *between* switches



IPR2023-00447 – '602 Patent (Ex. 1001) at Fig. 1A

- Raz's **subports** are *processors* (not links) that are *within* LSRs (not between)
- Raz uses a *single* high-speed link between LSRs



IPR2023-00447 – Raz (Ex. 1006) at Fig. 1, 1:56-59, 6:24-29, 7:42-45, 6:36-38

IPR2023-00447 – See POR, pp. 6-9, 12-13, 18, 25-29; Sur-Reply, pp. 2, 6-7, 18

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Raz:

There is thus a need for a forwarding and provisioning mechanism that enables a high speed packet stream to be processed by multiple processors that operate at a slower rate than the inbound packet stream. The mechanism should be

The present invention provides a subport forwarding and provisioning mechanism whereby a plurality of subports comprising slower speed processors are used to perform the packet processing for a higher speed packet stream. To provide the flexibility required for protocols such as MPLS, a network processor or FPGA is used to implement the subport.

ously assigned label indicating subport 3. The port forwarding module in LSR B examines the label in the received packet and in response thereto forwards the packet to subport 3 for packet processing. Unlabeled packets do not belong to

particular subport. The output of all the subports is aggregated and combined into a single high-speed packet stream and transmitted over the link. Inbound packets are received by the

Raz's Subports Do Not Disclose or Render Obvious a LAG

- Petitioner's Reply recognizes that Raz's subports are *processors* (not links) that are *within* LSRs (not between):

of a link (POR at 16) is misplaced. EX1021, ¶33. Subports are physical structures within an LSR and thus are different from the link between LSRs. EX1006, Cols.

speed stream.” POR at 15-16. But Raz discloses multiplexing as a design choice only because the processors within the LSRs are slower in speed than the external link between LSRs. EX1021, ¶¶30-32. As discussed above, it would have been an

IPR2023-00447 – Reply, pp. 8-9

- Petitioner's Reply recognizes that Raz teaches only a *single* high-speed link between LSRS:

While PO argues that Raz teaches the use of a single high-speed link to communicate streams between LSRS (POR at 8-9), that is merely a design choice.

IPR2023-00447 – Reply, p. 3

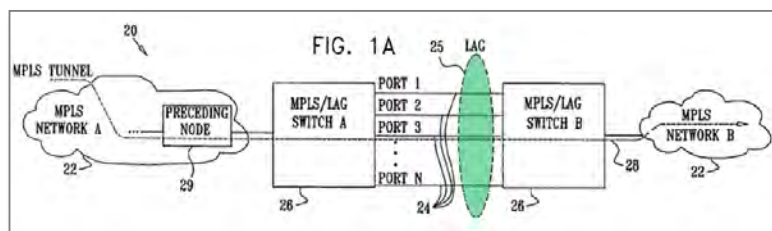
IPR2023-00447 – See Sur-Reply, pp. 2, 15, 18

Steptoe

Raz's Subports Do Not Disclose or Render Obvious a LAG

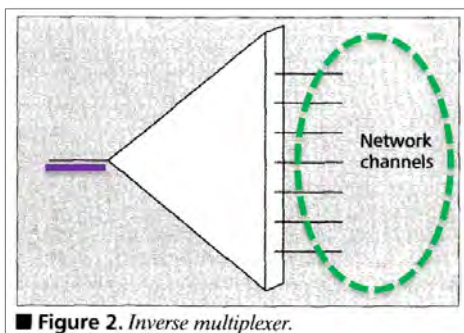
- Raz is directed to **multiplexing** subport outputs for transmission via the single high-speed link, which is the **opposite** of a **LAG** (i.e., **inverse multiplexing**)

'602 Patent:



IPR2023-00447 – '602 Patent
(Ex. 1001) at Fig. 1A

LAG (inverse multiplexing):

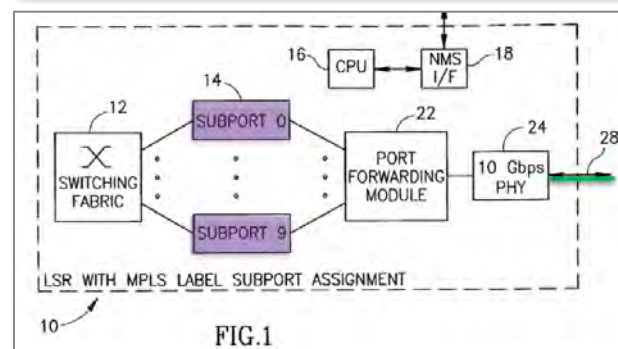


IPR2023-00447 – IEEE Commc'ns Magazine (Ex. 2010) at Figs. 1-2

Raz:

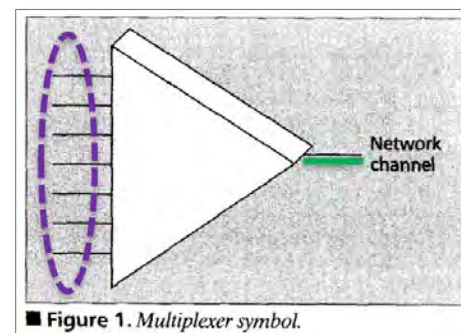
LINK MULTIPLEXING MECHANISM UTILIZING PATH ORIENTED FORWARDING

The present invention provides a link **multiplexing** mechanism utilizing path oriented forwarding. The mechanism



IPR2023-00447
– Raz (Ex. 1006)
at 1:1-2, 1:65-
66, Fig. 1

Multiplexing:



IPR2023-00447 – See POR, pp. 6-8, 15-16, 27-29; Sur-Reply, pp. 2, 4-8, 16-17

Steptoe

Raz's Subports Do Not Disclose or Render Obvious a LAG

- The Reply asserts a “function” argument that is **new**

Reply:

for the reasons discussed above in Sections III.A-III.C. A POSA reviewing Raz would have understood that Raz's subports act functionally like a LAG because the

34:5 (emphasis added). Thus, Dr. Rouskas himself admits that the subports within Raz function as if they were a LAG. *Id.*; EX1021, ¶¶58, 60; EX1007, Col. 1:34-36

IPR2023-00447 – Reply, p. 13

Petition:

Raz discusses the utilization of subports in a LAG within a LSR

Raz teaches the assignment of one subport of a LAG

As discussed above for Element [1.2], Raz discloses encoding the serial number of a physical tunnel subport of the LAG into the label. EX1004, ¶98. Further,

IPR2023-00447 – Petition, pp. 15-16, 23

IPR2023-00447 – See Sur-Reply, pp. 7-8

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Raz's Supports Do Not Disclose or Render Obvious a LAG

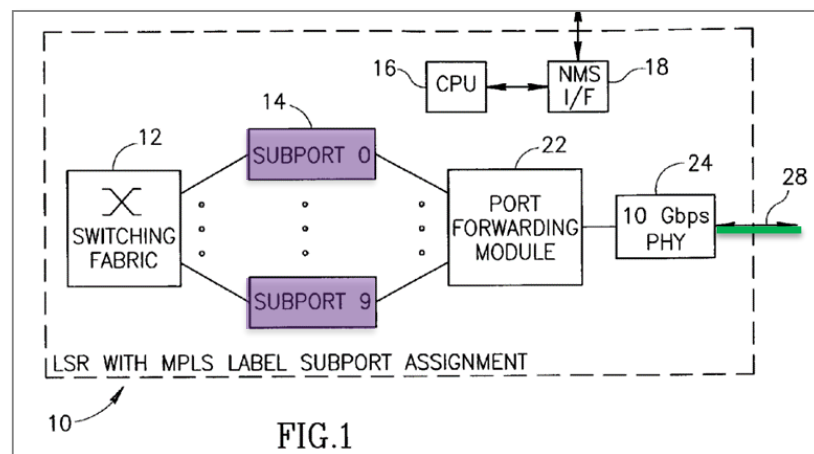
- The Reply's new "function" theory should be disregarded
 - PTAB Consolidated Trial Practice Guide (Nov. 2019) at 73-74 (instructing that "petitioner may not submit new evidence or argument in reply that it could have presented earlier," and "a reply ...that raises a new issue or belatedly presents evidence may not be considered")
 - *Intelligent Bio-Systems, Inc. v. Illumina Cambridge, Ltd.*, 821 F.3d 1359, 1369-70 (Fed. Cir. 2016) (affirming the Board's decision excluding petitioner's reply and accompanying declaration for presenting a new obviousness argument supported by new evidence not relied upon in the Petition)
 - *Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1367-68 (Fed. Cir. 2015) (approving "the Board's rejection of [petitioner's] reliance, in its Reply submissions, on previously unidentified portions of a prior-art reference to make a meaningfully distinct contention")
 - *Netflix, Inc. v. Avago Technologies International Sales Pte. Ltd.*, IPR2021-00542, Paper 34 at 36-40 (PTAB Sept. 6, 2022) (Droesch, ALJ) (denying to consider new reply theories because petitioner's reply cannot advance new theories "not explicitly offered or explained in the [p]etition," as this would impose an unfair and improper burden on patent owner), *aff'd*, Nos. 2022-1800, 2022-2208, 2024 U.S. App. LEXIS 5749 (Fed. Cir. Mar. 11, 2024)

Raz's Subports Do Not Disclose or Render Obvious a LAG

- The Reply's new "function" argument is **wrong**

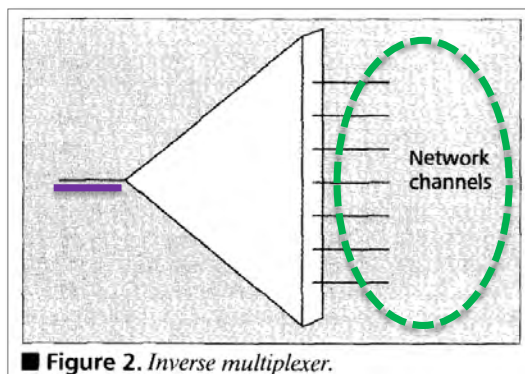
The present invention provides a subport forwarding and provisioning mechanism whereby a plurality of subports comprising slower speed processors are used to perform the packet processing for a higher speed packet stream. To pro-

In addition, the subports may be implemented using any suitable means. For example, commercially available network processors may be used to perform the packet processing at the subport speed (e.g., 1GE speeds). Alternatively, an FPGA may be suitably configured and programmed to perform the required packet processing.

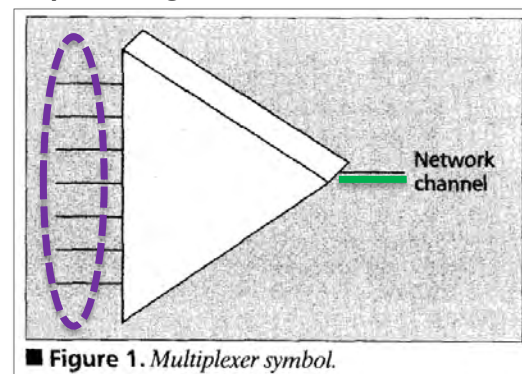


IPR2023-00447 – Raz (Ex. 1006) at 6:24-27, 7:59-64, Fig. 1

LAG (inverse multiplexing):



Multiplexing:



IPR2023-00447 –
IEEE Commc'ns
Magazine (Ex.
2010) at Figs. 1-2

IPR2023-00447 – See POR, pp. 6-8, 15-16, 26-29; Sur-Reply, pp. 2, 4-5, 7-8, 16-18

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Petitioner's New Reply Theories for Obviousness of a LAG Should Be Disregarded

- While the Petition relies on Raz's *subports* for the LAG, the Reply instead newly argues that:
 - LAGs were “well-known”
 - Raz's single high-speed link between LSRs was merely a “design choice”
 - Raz's single high-speed link between LSRs had “bandwidth limitations”
 - LAG was an obvious “alternative” to Raz's single high-speed link to “increase” link bandwidth between LSRs

LAGs were well-known in the art and widely used to communicate packet streams between switches or routers before the priority date for the '602 Patent, as demonstrated by both Raz and Ferguson. EX1006, Col. 9:9-28; EX1007, Cols. 1:57-2:3, 1:28-42, 3:36-4:19, Figures 2A-2B; EX1022 at 21:19-22:6, 27:20-28:16 (PO's expert Dr. Rouskas acknowledging the LAGs were well-known); EX1021, ¶14. A

While PO argues that Raz teaches the use of a single high-speed link to communicate streams between LSRs (POR at 8-9), that is merely a design choice. EX1021, ¶¶15-17. It would have been obvious to a POSA that high-speed packet

tunnel port of a LAG. *Id.* A single high-speed link has bandwidth limitations. If a given high-speed transmission requires more bandwidth than the physical limit of the high-speed link, then a POSA would have known that a LAG was an alternative that offers increased usable bandwidth for transmitting packets. EX1021, ¶15; EX1006, Col. 9:9-28; EX1007, Cols.1:28-2:3, 3:36-4:19, Figures 2A-2B; EX1022 at 21:19-22:6, 27:20-28:16. As Dr. Rouskas acknowledges, a LAG is treated as a

IPR2023-00447 – Reply, pp. 3-4

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IPR2023-00447 – See POR, p. 25; Sur-Reply, pp. 2-4, 14-15, 17-19

Petitioner's New Reply Theories for Obviousness of a LAG Should Be Disregarded

- These new Reply arguments rely on new evidence—including a new declaration (Ex.1021), and Ferguson (Ex.1007) for Ground 1—with no cites to the Petition or original declaration

LAGs were well-known in the art and widely used to communicate packet streams between switches or routers before the priority date for the '602 Patent, as demonstrated by both Raz and Ferguson. EX1006, Col. 9:9-28; EX1007, Cols. 1:57-2:3, 1:28-42, 3:36-4:19, Figures 2A-2B; EX1022 at 21:19-22:6, 27:20-28:16 (PO's expert Dr. Rouskas acknowledging the LAGs were well-known); EX1021, ¶14. A

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IPR2023-00447 – See Sur-Reply, pp. 2-4, 14-15, 17-19

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Petitioner's New Reply Theories for Obviousness of a LAG Should Be Disregarded

- The new Reply declaration likewise contains new argument and new evidence, with no cites to the original declaration

through a physical tunnel port of a LAG. A POSA would have known that the use of a LAG between routers or switches is a design choice alternative to the use of a single high speed link. For example, a single high speed link (such as the 10G link 28 disclosed in Raz) has physical limitations as to the amount of bandwidth it can provide. If a given high speed transmission requires more bandwidth than the physical limit of the high speed link, then a POSA would have known that a LAG was an alternative that offers a way to increase usable bandwidth for transmitting packets between routers or switches. As discussed above, LAGs were well-known and used in the art. EX1006, Col. 9:9-28; EX1007, Cols.1:57-2:3, 1:28-42, 3:36-4:19, Figures 2A-2B; EX1022 at 21:19-22:6, 27:20-28:16. Moreover, Dr. Rouskas

disagree. A POSA would have known from Raz that a LAG could have been used in place of high speed links 28, 60 or 68 in order to increase the transmission capacity between the LSRs shown in Figures 1 and 3. As discussed above, Raz discloses the “aggregate link speeds” of “larger capacity links” between devices, which a POSA would have understood to mean that aggregation is used for communication of high speed packet streams between devices. EX1006, Col. 1:40-46. Moreover, Dr.

IPR2023-00447 –
Bhattacharjee Reply Decl.
(Ex.1021), ¶¶ 15, 17

IPR2023-00447 – See POR, p. 25; Sur-Reply, pp. 2-4, 14-15

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Petitioner's New Reply Theories for Obviousness of a LAG Should Be Disregarded

- The Reply's new arguments and evidence regarding obviousness of a LAG should be disregarded
 - PTAB Consolidated Trial Practice Guide (Nov. 2019) at 73-74 (instructing that “petitioner may not submit new evidence or argument in reply that it could have presented earlier,” and “a reply ...that raises a new issue or belatedly presents evidence may not be considered”)
 - *Intelligent Bio-Systems, Inc. v. Illumina Cambridge, Ltd.*, 821 F.3d 1359, 1369-70 (Fed. Cir. 2016) (affirming the Board's decision excluding petitioner's reply and accompanying declaration for presenting a new obviousness argument supported by new evidence not relied upon in the Petition)
 - *Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1367-68 (Fed. Cir. 2015) (approving “the Board's rejection of [petitioner's] reliance, in its Reply submissions, on previously unidentified portions of a prior-art reference to make a meaningfully distinct contention”)
 - *Netflix, Inc. v. Avago Technologies International Sales Pte. Ltd.*, IPR2021-00542, Paper 34 at 36-40 (PTAB Sept. 6, 2022) (Droesch, ALJ) (denying to consider new reply theories because petitioner's reply cannot advance new theories “not explicitly offered or explained in the [p]etition,” as this would impose an unfair and improper burden on patent owner), *aff'd*, Nos. 2022-1800, 2022-2208, 2024 U.S. App. LEXIS 5749 (Fed. Cir. Mar. 11, 2024)

Petitioner's New Reply Theories Fail to Render Obvious a LAG Between Raz's LSRs

- The Reply's new theories fail to identify any LAG in Raz and thus fail to show obviousness
 - *Univ. of Strathclyde v. Clear-Vu Lighting LLC*, 17 F.4th 155, 160 (Fed. Cir. 2021) (holding that “[a]n obviousness determination generally requires a finding that all claimed limitations are disclosed in the prior art” (quotation omitted))

Petitioner's New Reply Theories Fail to Render Obvious a LAG Between Raz's LSRs

- Replacing Raz's single high-speed link with a LAG was not an obvious “**design choice**,” as it would result in **different structure and function** than Raz's multiplexing of internal subports' outputs into a single stream
 - *In re Gal*, 980 F.2d 717, 719-720 (Fed. Cir. 1992) (finding no “obvious design choice” where the claimed structure and the function it performed were different from the prior art)
 - *Ex parte Maeda*, Appeal No. 2010-009814, Decision on Appeal, at 6-7 (PTAB Oct. 23, 2012) (Informative) (holding that the “proposed modification of Meserole is not an obvious design choice” because it “would result in a different function than that shown by Meserole”)

Raz:

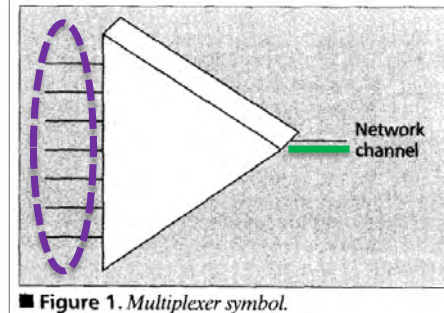
LINK MULTIPLEXING MECHANISM UTILIZING PATH ORIENTED FORWARDING

The present invention relates generally to data communications and more particularly relates to a link multiplexing mechanism utilizing path oriented forwarding.

The present invention provides a link multiplexing mechanism utilizing path oriented forwarding. The mechanism

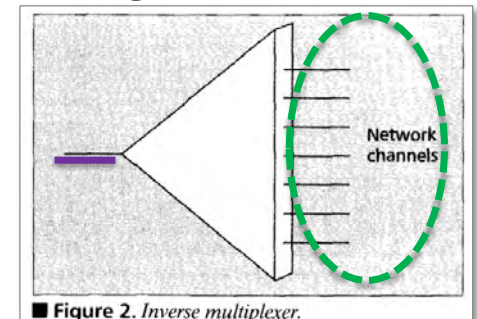
IPR2023-00447 – Raz (Ex. 1006) at 1:1-2, 1:6-8, 1:65-66

Multiplexing:



■ Figure 1. Multiplexer symbol.

LAG:



■ Figure 2. Inverse multiplexer.

IPR2023-00447 – IEEE Commc'ns Magazine (Ex. 2010) at Figs. 1-2

Petitioner
recognizes:

would have understood that, if a LAG were available between LSRs, there would be no need to multiplex the packet streams transmitted between LSRs, as shown by

IPR2023-00447 –
Reply, p. 9

IPR2023-00447 – See POR, pp. 6-8, 15-16, 27-29; Sur-Reply, pp. 2, 4-8, 16-17

Steptoe

Petitioner's New Reply Theories Fail to Render Obvious a LAG Between Raz's LSRs

- There is no motivation to replace Raz's single high-speed link with a LAG
 - *Virtek Vision Int'l ULC v. Assembly Guidance Sys., Inc.*, __ F.4th __, 2024 U.S. App. LEXIS 7185, at *6-9 (Fed. Cir. Mar. 27, 2024) (knowledge of “alternative” is insufficient for motivation).

Reply:

tunnel port of a LAG. *Id.* A single high-speed link has bandwidth limitations. If a given high-speed transmission requires more bandwidth than the physical limit of the high-speed link, then a POSA would have known that a LAG was an alternative that offers increased usable bandwidth for transmitting packets. EX1021, ¶15;

IPR2023-00447 –
Reply, pp. 3-4

Sur-Reply:

that a POSA might have wanted additional bandwidth for the single high-speed link already discussed in Raz, nothing more.

At most, it establishes

IPR2023-00447 –
Sur-Reply, p. 6

Dr. Rouskas:

56. It is my opinion that a POSA would not have been motivated by Raz to use multiple *external* links to increase the bandwidth *between* LSRs (e.g., a LAG) because Raz describes that the capacity of such external links or streams between LSRs already exceeds the capacity of internal processors. Raz at 1:40-51

IPR2023-00447 –
Rouskas Decl.
(Ex. 2007), ¶ 56)

IPR2023-00447 – See POR, pp. 13, 20; Sur-Reply, pp. 6-7

Steptoe

A LAG Is Not Disclosed or Obvious Between Raz's LSRs

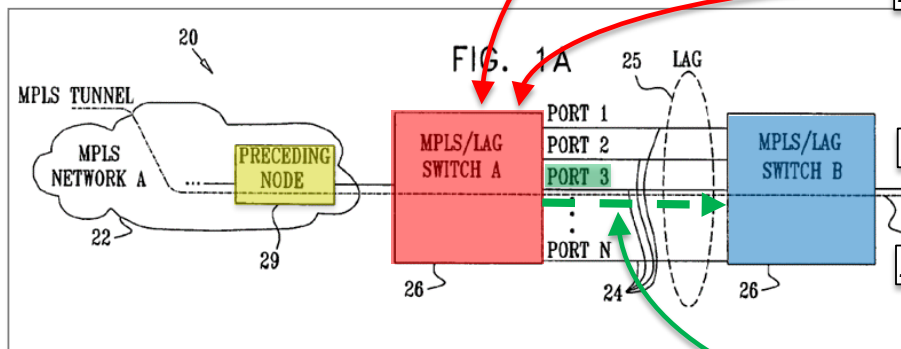
- Therefore, the claimed LAG is not disclosed or rendered obvious in Raz based on either:
 - The Petition's support arguments
 - The Reply's new "function" argument or new obviousness theories

Ground 1 (Raz):

Raz Does Not Disclose or Render Obvious a First MPLS/LAG Switch Assigning and Encoding a Single Physical Tunnel Port for *Sending* a Packet Between MPLS/LAG Switches

'602 Patent Claimed Process

- a single physical tunnel port of a LAG is (1.1) assigned and (1.2) encoded in a label by the first MPLS/LAG switch; and
- the first switch receives a packet with the label from the preceding node and then (1.5) **SENDS** it via the single physical tunnel port



What is claimed is:

1. A method for assigning and utilizing an Ethernet physical data port in an Ethernet Link Aggregation Group (LAG) in a Multi-Protocol Label Switching (MPLS) network, the method comprising the steps of:

- 1.1 assigning, by a first MPLS/LAG switch, a single physical tunnel port of a LAG to a network tunnel, wherein the single physical tunnel port of the LAG meets a bandwidth requirement of the network tunnel, and wherein said single physical tunnel port of the LAG has a port serial number;
- 1.2 dedicating a sub-set of bits in a data packet label prepared by the first MPLS/LAG switch to encode said port serial number of said single physical tunnel port of the LAG into the data packet label;
- 1.3 sending, by said first MPLS/LAG switch, the data packet label, in which said port serial number of said single physical tunnel port is encoded, to a preceding node;
- 1.4 receiving from the preceding node, by said first MPLS/LAG switch, a data packet comprising said data packet label, in which said port serial number of said single physical tunnel port is encoded; and
- 1.5 sending said data packet from said first MPLS/LAG switch to a second MPLS/LAG switch via said single physical tunnel port having the port serial number encoded in the data packet label.

IPR2023-00447 – '602 Patent (Ex. 1001) at Fig. 1A, claim 1

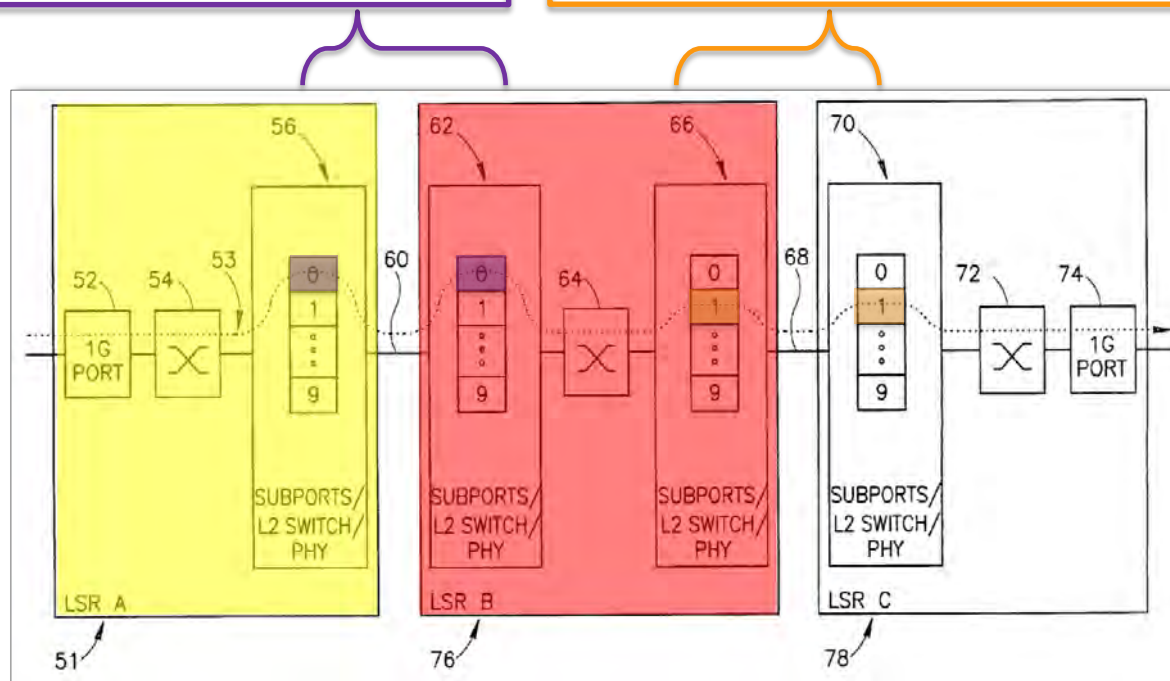
IPR2023-00447 – See POR, pp. 2-4, 9-10, 23, 29-31, 37, 39, 42; Sur-Reply, pp. 8-11

Steptoe

Raz's Mechanism

a subport is assigned and encoded in a label by a **first LSR**, which uses that subport for packets it **RECEIVES** from the preceding LSR

whatever subport is used for packets that the **first LSR sends** to the next downstream LSR is independently selected and encoded in a label by that next downstream LSR



IPR2023-00447 – Raz (Ex. 1006) at Fig. 3

IPR2023-00447 – See POR, pp. 10-12, 29-42; Sur-Reply, pp. 9-14

Steptoe

Raz's Mechanism

width. Note that it is the downstream (i.e. receiving) node that determines the subport it wants to receive the LSP on. This

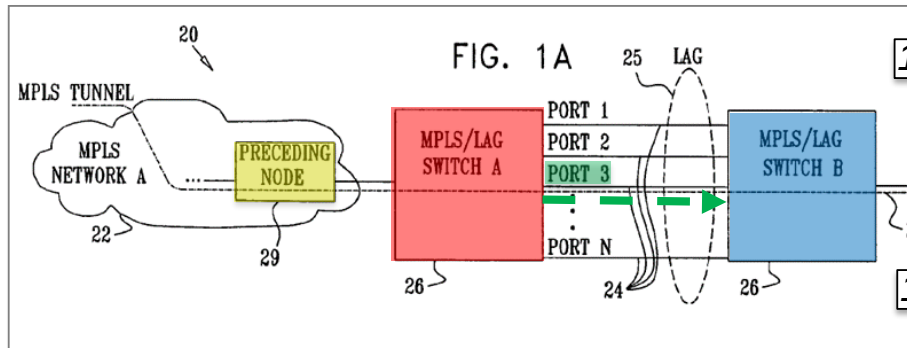
to 1G subports is based on LSPs. Thus, the MPLS label is used in order to assign an incoming packet to one of the subports.

itself. The subports used on both sides of the next hop, however, are independent of the current hop. Thus, the subports may be different for each hop of the connection.

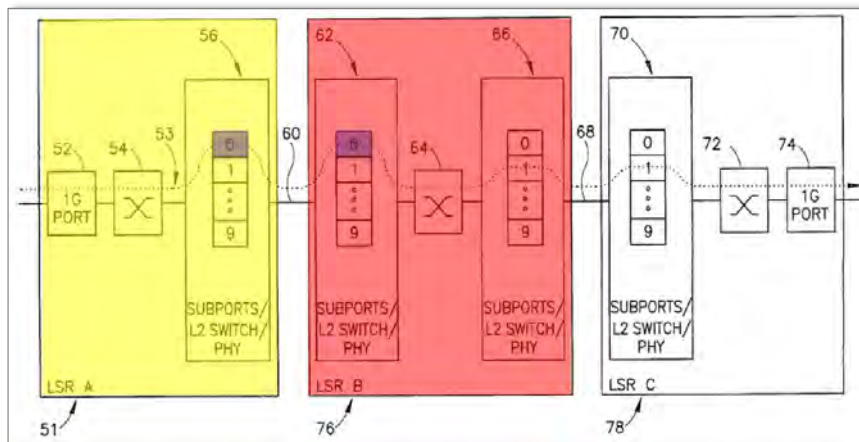
IPR2023-00447 – Raz (Ex. 1006) at 7:26-27, 7:18-19, 6:43-45

Raz Fails Even If Somehow Modified to Apply Between LSRs

'602 Claims:



Raz:



IPR2023-00447 – Raz (Ex. 1006) at Fig. 3

What is claimed is:

1. A method for assigning and utilizing an Ethernet physical data port in an Ethernet Link Aggregation Group (LAG) in a Multi-Protocol Label Switching (MPLS) network, the method comprising the steps of:

- 1.1 assigning, by a first MPLS/LAG switch, a single physical tunnel port of a LAG to a network tunnel, wherein the single physical tunnel port of the LAG meets a bandwidth requirement of the network tunnel, and wherein said single physical tunnel port of the LAG has a port serial number;
- 1.2 dedicating a sub-set of bits in a data packet label prepared by the first MPLS/LAG switch to encode said port serial number of said single physical tunnel port of the LAG into the data packet label;
- 1.3 sending, by said first MPLS/LAG switch, the data packet label, in which said port serial number of said single physical tunnel port is encoded, to a preceding node;
- 1.4 receiving from the preceding node, by said first MPLS/LAG switch, a data packet comprising said data packet label, in which said port serial number of said single physical tunnel port is encoded; and
- 1.5 sending said data packet from said first MPLS/LAG switch to a second MPLS/LAG switch via said single physical tunnel port having the port serial number encoded in the data packet label.

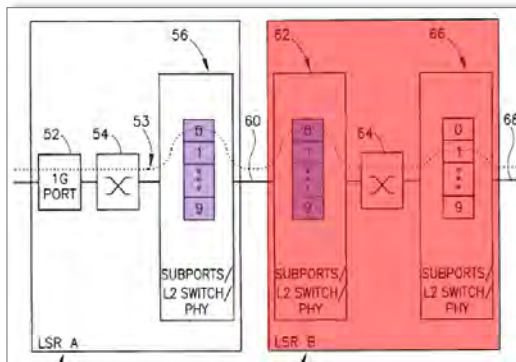
IPR2023-00447 – '602 Patent (Ex. 1001) at Fig. 1A, claim 1

IPR2023-00447 – See POR, pp. 10-12, 38-42; Sur-Reply, pp. 8-14

Steptoe

The Petition Fails to Show that Raz Teaches Limitation 1.5

- Petition relies on a single example of Raz, which does not teach limitation 1.5 because:
 - i) subport 3 is not part of a LAG;
 - ii) packets are not sent *between* LSRs “via” subport 3;
 - iii) subport 3 is used by LSR B for *receiving* packets, not “sending”
 - iv) relies on what “could” happen



IPR2023-00447 – Raz (Ex. 1006) at Fig. 3, 7:39-45

[1.5] sending said data packet from said first MPLS/LAG switch to a second MPLS/LAG switch via said single physical tunnel port having the port serial number encoded in the data packet label.

Element [1.5] relates to sending the data packet from the first MPLS/LAG switch to a second MPLS/LAG switch. EX1001, Col. 9:44-47. This element is taught and rendered obvious by Raz. EX1004, ¶¶106-109.

Raz discloses sending a data packet from a first MPLS/LAG switch to a second MPLS/LAG switch via a single physical tunnel port having the port serial number encoded in the data packet label. EX1004, ¶107. For example, LSR B in the example described in Column 7 of Raz is the LSR that generates the data packet label in which the port serial number (e.g., subport 3) is encoded, and it corresponds to the claimed first MPLS/LAG switch. EX1006, Col. 7:17-29; EX1004, ¶107. A POSA would have understood that the data packet in LSR B could be sent to another LSR (which would correspond to the claimed second MPLS/LAG switch) via a physical tunnel subport (subport 3) having the port serial number encoded in the data

When a packet for the provisioned LSP is received over a link connected to LSR A, it is forwarded to subport 3 and subsequently out over the 10G link to LSR B with the previously assigned label indicating subport 3. The port forwarding module in LSR B examines the label in the received packet and in response thereto forwards the packet to subport 3 for packet processing. Unlabeled packets do not belong to communicated from one LSR to another in Raz. EX1004, ¶108.

IPR2023-00447 – Petition, pp. 24-25

Steptoe

The Petition Fails to Show that Raz Renders Obvious Limitation 1.5

- Petition fails to show obviousness
 - 1) “could be sent to another LSR ... via ... subport 3”
 - Wrong because subport 3 is *within* LSR B and is used for *receiving*, and whatever subport is used for the next hop is independently assigned and labeled by the next downstream LSR
 - 2) “the same way as packets [are] communicated from one LSR to another in Raz”
 - This “way” in Raz is via a *single high-speed link*, not a LAG
 - Neither explain *why* or *how* Raz’s embodiment would be modified to meet the claim

IPR2023-00447 – Petition, pp. 24-25

[1.5] sending said data packet from said first MPLS/LAG switch to a second MPLS/LAG switch via said single physical tunnel port having the port serial number encoded in the data packet label.

Element [1.5] relates to sending the data packet from the first MPLS/LAG switch to a second MPLS/LAG switch. EX1001, Col. 9:44-47. This element is taught and rendered obvious by Raz. EX1004, ¶¶106-109.

Raz discloses sending a data packet from a first MPLS/LAG switch to a second MPLS/LAG switch via a single physical tunnel port having the port serial number encoded in the data packet label. EX1004, ¶107. For example, LSR B in the example described in Column 7 of Raz is the LSR that generates the data packet label in which the port serial number (e.g., subport 3) is encoded, and it corresponds to the claimed first MPLS/LAG switch. EX1006, Col. 7:17-29; EX1004, ¶107. A POSA would have understood that the data packet in LSR B could be sent to another LSR (which would correspond to the claimed second MPLS/LAG switch) via a physical tunnel subport (subport 3) having the port serial number encoded in the data packet label. EX1006, Col. 7:39-45; *see id.*, Cols. 7:17-29, 9:29-58, 14:23-26, Figures 3-4; EX1004, ¶107.

As discussed above for Elements [1.0]-[1.4], it would have been within the knowledge of a POSA to communicate packets from a first MPLS/LAG switch to a second MPLS/LAG switch in a MPLS network in the same way as packets communicated from one LSR to another in Raz. EX1004, ¶108.

IPR2023-00447 – See POR, pp. 10-12, 22-23, 35-38; Sur-Reply, pp. 8-10, 21

Steptoe

Petitioner's Reply Misreads the Claims

- According to the claims, the first MPLS/LAG switch must assign the single physical tunnel port used for sending the packet between the first and second MPLS/LAG switches

Claim 1:

What is claimed is:

assigning, **by a first MPLS/LAG switch,** **a single physical tunnel port of a LAG** to a network tunnel, wherein the

sending said data packet from said first MPLS/LAG switch to a second MSPLS/LAG switch **via said single physical tunnel port** having the port serial number encoded in the data packet label.

IPR2023-00447 –
'602 Patent (Ex.
1001) at claim 1

- The Reply improperly reads this requirement out of the claim

Reply:

serial number encoded in the data packet label.” EX1001, Col. 9:44-47. The claims do not require that the first switch **assign** the single physical tunnel port to be used to send a data packet to the second switch.¹ *Id.*; EX1021, ¶19.

IPR2023-00447 – Reply, p. 5

IPR2023-00447 – See POR, pp. 2-4, 9-10; Sur-Reply, pp. 8-11

Steptoe

Petitioner's Reply Misreads the Claims

- Petitioner's expert (Dr. Bhattacharjee) and the petitioner's expert in IPR2023-00839 (Dr. Min) both agree with Patent Owner that the single physical tunnel port for sending the packet *must be assigned by the first switch*

Dr. Bhattacharjee:

Q. So the claimed single physical tunnel port is assigned by the first MPLS/LAG switch which is the sending switch, correct?

THE DEPONENT: Yeah, it's the first MPLS/LAG switch.

IPR2023-00447 – Bhattacharjee Dep. (Ex. 2008) at 97:13-19

Dr. Min:

Q. And this limitation recites that the first MPLS/LAG switch sends the data packet via the claimed single physical tunnel port that the first MPLS/LAG switch assigned and prepared a label for in the earlier limitations, correct?

THE DEPONENT: Yep, that's correct.

IPR2023-00839 – Min Dep. (Ex.2013) at 52:20–53:1
(cited in IPR2023-00447 – Sur-Reply, p. 11)

IPR2023-00447 – See Sur-Reply, p. 11

Steptoe

Petitioner's Alternative Argument Is New and Fails

- The Reply alternatively asserts that this claim requirement—i.e., the single physical tunnel port for sending the packet is *assigned by the first switch*—is obvious:

Reply (footnote 1):

¹ Even if the claims of the '602 Patent do require that the first MPLS/LAG switch assign the single physical tunnel port to be used to send a data packet to the second MPLS/LAG switch, this would have been a straightforward design choice in view of Raz (and a simpler configuration to implement) EX1021, ¶21.

IPR2023-00447 – Reply, p. 5 n.1;
Bhattacharjee Reply Decl. (Ex. 1021), ¶ 21

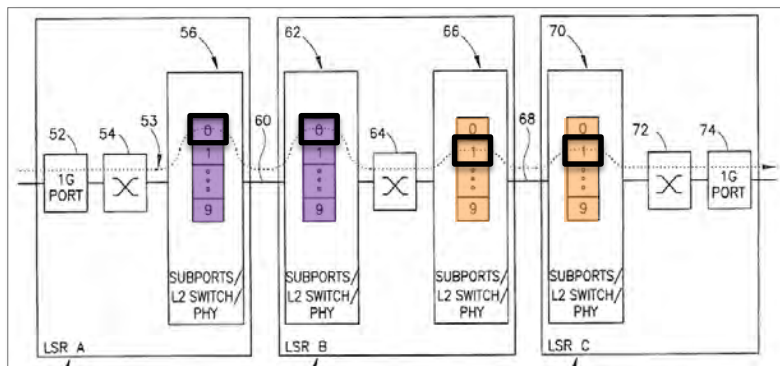
New Reply Declaration:

21. Further, I note that, even if the claims of the '602 Patent do require that the first MPLS/LAG switch assign the single physical tunnel port to be used to send a data packet to the second MPLS/LAG switch, it remains my opinion that a POSA would have found the claims to be obvious in light of Raz. It would be a straightforward design choice in view of Raz to have the first MPLS/LAG switch assign the single physical tunnel port to be used to send a packet to the second MPLS/LAG switch. Given that Raz teaches that each successive LSR (or MPLS/LAG switch) determines the subport number on which a packet can be received, then a POSA would have found it obvious that a first LSR could determine both the subport number on which it will receive a packet and the subport number on which a downstream second LSR will receive the packet. Indeed, this is a simpler design choice than what is employed in Raz.

- But this is an improper new theory and should be disregarded
- Also, this new Reply theory fails:
 - It is conclusory
 - Its “design choice” assertion is both (i) insufficient and (ii) wrong
 - (i) *Cutsforth, Inc. v. MotivePower, Inc.*, 636 Fed. App'x 575, 578 (Fed. Cir. 2016) (“Merely stating that a particular placement of an element is a design choice does not make it obvious.”)
 - (ii) *In re Gal*, 980 F.2d 717, 719-720 (Fed. Cir. 1992) (finding no “obvious design choice” where the claimed structure and the function it performed were different from the prior art)

Petitioner's "same subport number" Argument Is New and Should Be Disregarded

- Petitioner's Reply and new declaration argue for the first time that the "same subport number" could be used by consecutive pairs of LSRs



IPR2023-00447 – Raz (Ex. 1006) at Fig. 3

Reply:

Second, it would have been obvious to a POSA that the same subport could have been used in Raz for the transmission of a data packet from the preceding LSR to the first LSR to the second LSR. EX1021, ¶20; EX1006, Cols. 7:17-29, 7:39-45,

that is wrong. POR at 11. As Dr. Rouskas acknowledges, the same subport number could have been used to transmit a data packet from LSR A to LSR B to LSR C in Figure 3. EX1022 at 65:18-68:13; EX1021, ¶22. It is merely a matter of bandwidth

IPR2023-00447 – Reply, pp. 5-6

New Reply Declaration:

and receive the data packet at the second LSR. Instead, a POSA would have understood from Raz that the same subport number could have been used for the transmission of a packet from the preceding LSR to the first LSR and then from the first LSR to the second LSR. EX1006, Cols. 7:17-29, 7:39-45, 9:29-58, 14:23-26, Figures 3-4. Indeed, Dr. Rouskas admitted during his deposition that a POSA reading Raz would have understood that the same subport number could have been used to transmit a data packet from the preceding LSR to the first LSR to the second LSR. EX1022 at 65:18-68:13. Further, it is my opinion that Dr. Rouskas is incorrect

IPR2023-00447 – Bhattacharjee Reply Decl. (Ex. 1021), ¶ 20

IPR2023-00447 – See Sur-Reply, pp. 12-13

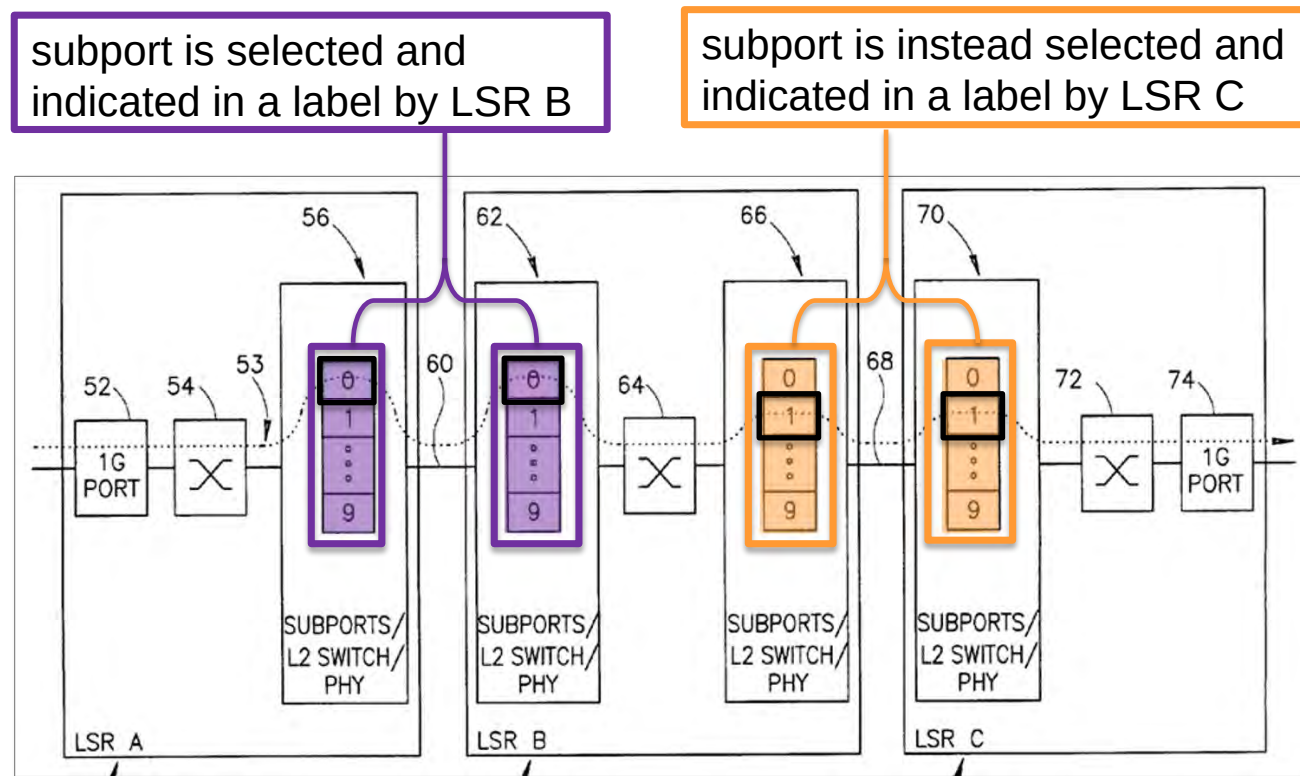
Steptoe

Petitioner's "same subport number" Argument Is New and Should Be Disregarded

- The Reply's new "same subport number" argument and evidence regarding should be disregarded
 - PTAB Consolidated Trial Practice Guide (Nov. 2019) at 73-74 (instructing that "petitioner may not submit new evidence or argument in reply that it could have presented earlier," and "a reply ...that raises a new issue or belatedly presents evidence may not be considered")
 - *Intelligent Bio-Systems, Inc. v. Illumina Cambridge, Ltd.*, 821 F.3d 1359, 1369-70 (Fed. Cir. 2016) (affirming the Board's decision excluding petitioner's reply and accompanying declaration for presenting a new obviousness argument supported by new evidence not relied upon in the Petition)
 - *Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1367-68 (Fed. Cir. 2015) (approving "the Board's rejection of [petitioner's] reliance, in its Reply submissions, on previously unidentified portions of a prior-art reference to make a meaningfully distinct contention")
 - *Netflix, Inc. v. Avago Technologies International Sales Pte. Ltd.*, IPR2021-00542, Paper 34 at 36-40 (PTAB Sept. 6, 2022) (Droesch, ALJ) (denying to consider new reply theories because petitioner's reply cannot advance new theories "not explicitly offered or explained in the [p]etition," as this would impose an unfair and improper burden on patent owner), *aff'd*, Nos. 2022-1800, 2022-2208, 2024 U.S. App. LEXIS 5749 (Fed. Cir. Mar. 11, 2024)

Petitioner's "same subport number" Argument Fails to Render the Claims Obvious

- Regardless, the Reply's new argument is wrong because despite having similar numbering, the subports used for transmissions from LSR B to LSR C are not the same as the subports used for transmissions from LSR A to LSR B



IPR2023-00447 – Raz (Ex. 1006) at Fig. 3

IPR2023-00447 – See Sur-Reply, pp. 12-14

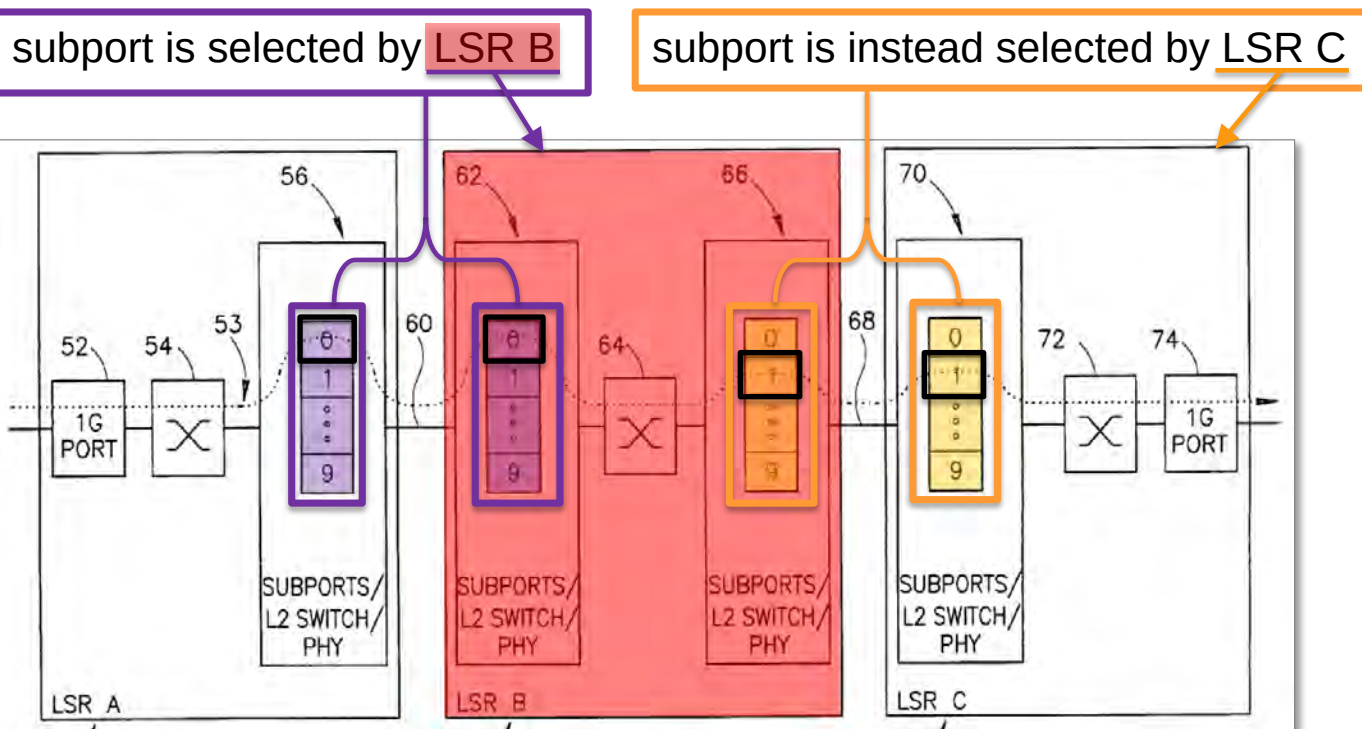
Steptoe

Petitioner's "same subport number" Argument Fails to Render the Claims Obvious

- Also, the Reply's new argument fails to address or meet the claim requirement that the single physical tunnel port used for sending *must be assigned by the first switch*

should be subport 1. The CAC in LSR B determines that the best subport for receiving the LSP is on subport 0 on the inbound link and therefore assigns a label of 0x40005. This

When the LSP is signaled, the CAC in LSR C decides to provision the LSP on subport 1 and therefore assigns the label 0x22003. With reference to FIG. 4, each label 140 comprises



IPR2023-00447 – Raz (Ex. 1006) at 9:51-53, 9:42-44, Fig. 3

IPR2023-00447 – See POR, pp. 10-11, 39-42; Sur-Reply, pp. 12-14

Steptoe

Ground 1 (Raz):

**There Is No Motivation to Modify Raz
to Arrive at the '602 Patent's Invention**

IPR2023-00447 – See POR, pp. 4-8, 12-24, 27-29, 35-38; Sur-Reply, pp. 2-8, 12, 14-21

Steptoe

-45-

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Cisco v. Corrigent - IPR2023-00447
Patent Owner Corrigent Exhibit 2013-0045

Raz's Mechanism Is Specifically for Inside an LSR and Teaches Away from External Use

Further, it is intended that the mechanism of the present invention be implemented in network devices such as routers (e.g., LSRs in MPLS networks) making up the nodes in a network and include edge nodes and intermediate nodes. It is

BACKGROUND OF THE INVENTION

capable of handling large and larger amounts of traffic. A problem arises, however, when the aggregate link speeds exceed the capacity of the internal circuits used to process the inbound and outbound packet streams. For example, consider

There is thus a need for a forwarding and provisioning mechanism that enables a high speed packet stream to be processed by multiple processors that operate at a slower rate than the inbound packet stream. The mechanism should be

SUMMARY OF THE INVENTION

The present invention provides a link multiplexing mechanism utilizing path oriented forwarding. The mechanism comprises a subport forwarding and provisioning mechanism whereby a plurality of subports comprising slower speed processors are used to perform the packet processing for a higher speed packet stream. To provide the flexibility

ABSTRACT

A subport forwarding and provisioning mechanism whereby a plurality of subports implemented using slower speed processors are used to perform the packet processing for a higher speed packet stream. Outbound packets are assigned a sub-

DETAILED DESCRIPTION OF THE INVENTION

The present invention provides a subport forwarding and provisioning mechanism whereby a plurality of subports comprising slower speed processors are used to perform the packet processing for a higher speed packet stream. To pro-

IPR2023-00447 – Raz (Ex. 1006) at 6:51-54, 1:43-46, 1:56-59, 1:65-2:3, Abstract, 6:24-27

IPR2023-00447 – See POR, pp. 12-13; Sur-Reply, p. 14

Steptoe

Raz Addresses a Different Problem than the '602 Claims

- Raz's problem is how to handle a single high-speed link with slow-speed processors within an LSR

Raz:

The present invention provides a subport forwarding and provisioning mechanism whereby a plurality of subports comprising slower speed processors are used to perform the packet processing for a higher speed packet stream. To pro-

IPR2023-00447 – Raz (Ex. 1006) at 6:24-27

- The '602 patent concerns a LAG between switches and assumes that the switches have sufficient processing capacity, so Raz's problem is not an issue

'602 Patent:

What is claimed is:

1. A method for assigning and utilizing an Ethernet physical data port in an Ethernet Link Aggregation Group (LAG) in a Multi-Protocol Label Switching (MPLS) network, the

IPR2023-00447 – '602 Patent (Ex. 1001) at claim 1

Raz Addresses a Different Problem than the '602 Claims

- The Reply tries to show a similar problem in Raz and the '602 patent by conflating **processing** capacity with **link** bandwidth:

45, 11:3-12, Figure 5. Both Raz and the '602 Patent aggregate slower speed communication pathways (the “slow speed” processors within the LSR in Raz and the slower speed links between MPLS/LAG switches in the '602 Patent) to maximize available bandwidth. EX1021, ¶¶26-27, 34, 39.

IPR2023-00447 – Reply, p. 7

- But:
 - The Reply concedes that **Raz** is about maximizing capacity of **processors** whereas the **'602 patent** instead concerns **links**
 - The Reply acknowledges that **processors (Raz's subports)** and **links (LAG)** are different:

of a link (POR at 16) is misplaced. EX1021, ¶33. Subports are physical structures within an LSR and thus are different from the link between LSRs. EX1006, Cols. 2:15-16, 6:38-41, 7:20, 8:46-47, Figure 3. The use of a LAG as a link between LSRs would not affect the subports within the LSRs. EX1021, ¶¶33, 45.

IPR2023-00447 – Reply, p. 9

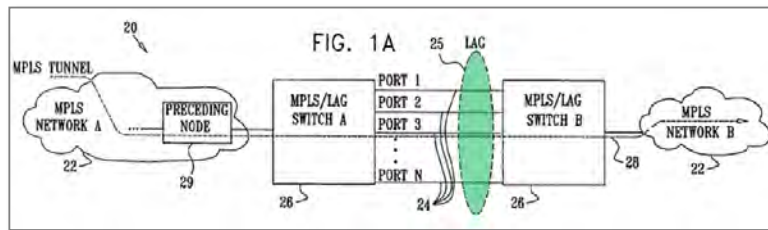
IPR2023-00447 – See Sur-Reply, pp. 15-16

Steptoe

Raz Would Be Inoperable for Its Intended Purpose: Multiplexing

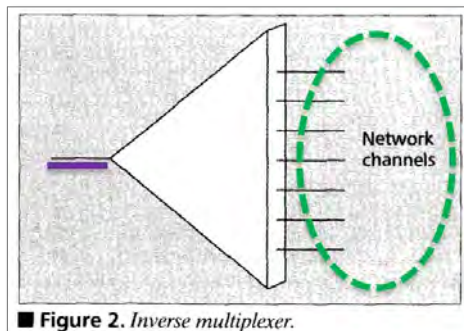
- Raz is directed to **multiplexing** subport outputs for transmission via the single high-speed link, which is the **opposite** of a **LAG** (i.e., inverse multiplexing)

'602 Patent:



IPR2023-00447 – '602 Patent (Ex. 1001) at Fig. 1A

LAG (inverse multiplexing):



■ Figure 2. Inverse multiplexer.

IPR2023-00447 – IEEE Commc'ns Magazine (Ex. 2010) at Figs. 1-2

IPR2023-00447 – See POR, pp. 6-8, 15-16, 27-29; Sur-Reply, pp. 2, 4-8, 16-17

Steptoe

Raz:

LINK MULTIPLEXING MECHANISM UTILIZING PATH ORIENTED FORWARDING

The present invention provides a link **multiplexing** mechanism utilizing path oriented forwarding. The mechanism

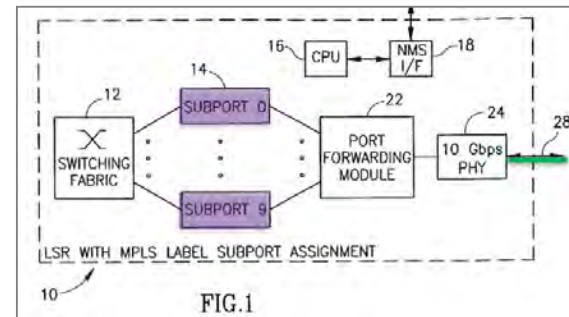
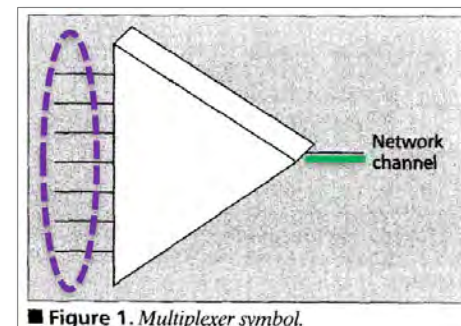


FIG.1

IPR2023-00447 – Raz (Ex. 1006) at 1:1-2, 1:65-66, Fig. 1

Multiplexing:



■ Figure 1. Multiplexer symbol.

Raz Would Be Inoperable for Its Intended Purpose: *Multiplexing*

- Petitioner does not deny that Raz's multiplexing is the opposite of a LAG and would not have been used with a LAG
- Petitioner's Reply instead argues that (i) Raz's multiplexing was a "**design choice**" and (ii) a LAG was an obvious "**alternative**":

speed stream." POR at 15-16. But Raz discloses multiplexing as a design choice only because the processors within the LSRs are slower in speed than the external link between LSRs. EX1021, ¶¶30-32. As discussed above, it would have been an obvious alternative for a POSA to use a LAG between LSRs if there is a need to increase the bandwidth of the link between the LSRs. EX1021, ¶¶31-32. A POSA would have understood that, if a LAG were available between LSRs, there would be no need to multiplex the packet streams transmitted between LSRs, as shown by Ferguson. EX1007, Cols. 1:28-2:3, Figures 2A-2B; EX1021, ¶¶31-32, 45.

IPR2023-00447 – Reply, pp. 8-9

IPR2023-00447 – See Sur-Reply, pp. 16-17

Steptoe

Raz Would Be Inoperable for Its Intended Purpose: Multiplexing

- But: (1) Raz's multiplexing is not a mere “**design choice**,” as removing it for a LAG would result in **different structure and function**
 - *In re Gal*, 980 F.2d 717, 719-720 (Fed. Cir. 1992) (finding no “obvious design choice” where the claimed structure and the function it performed were different from the prior art)
 - *Ex parte Maeda*, Appeal No. 2010-009814, Decision on Appeal, at 6-7 (PTAB Oct. 23, 2012) (Informative) (holding that the “proposed modification of Meserole is not an obvious design choice” because it “would result in a different function than that shown by Meserole”)

Raz:

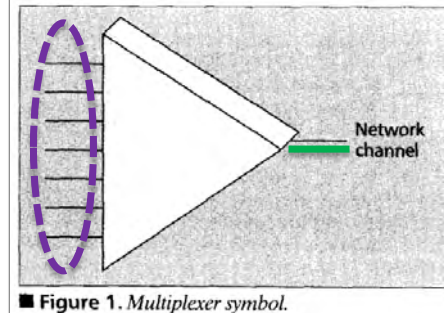
LINK MULTIPLEXING MECHANISM UTILIZING PATH ORIENTED FORWARDING

The present invention relates generally to data communications and more particularly relates to a link multiplexing mechanism utilizing path oriented forwarding.

The present invention provides a link multiplexing mechanism utilizing path oriented forwarding. The mechanism

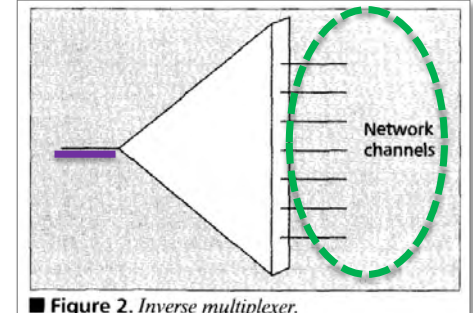
IPR2023-00447 – Raz (Ex. 1006) at 1:1-2, 1:6-8, 1:65-66

Multiplexing:



IPR2023-00447 – IEEE Commc'ns Magazine (Ex. 2010) at Figs. 1-2

LAG:



Petitioner
recognizes:

would have understood that, if a LAG were available between LSRs, there would be no need to multiplex the packet streams transmitted between LSRs, as shown by

IPR2023-00447 –
Reply, p. 9

Steptoe

IPR2023-00447 – See POR, pp. 6-8, 15-16, 27-29; Sur-Reply, pp. 2, 4-8, 16-17

Raz Would Be Inoperable for Its Intended Purpose: *Multiplexing*

- But: (2) Petitioner’s argument about a LAG as an “obvious alternative” to Raz’s multiplexing fails because:
 - (i) it is an improper new Reply theory that should be disregarded
 - PTAB Consolidated Trial Practice Guide (Nov. 2019) at 73-74 (instructing that “petitioner may not submit new evidence or argument in reply that it could have presented earlier”)
 - *Intelligent Bio-Systems, Inc. v. Illumina Cambridge, Ltd.*, 821 F.3d 1359, 1369-70 (Fed. Cir. 2016) (affirming the Board’s decision excluding petitioner’s reply and declaration for presenting new argument)
 - *Netflix, Inc. v. Avago Technologies International Sales Pte. Ltd.*, IPR2021-00542, Paper 34 at 36-40 (PTAB Sept. 6, 2022) (Droesch, ALJ) (recognizing that petitioner’s reply cannot advance new theories “not explicitly offered or explained in the [p]etition”), *aff’d*, 2024 U.S. App. LEXIS 5749 (Fed. Cir. Mar. 11, 2024)
 - (ii) it fails to establish motivation

Reply:

between LSRs. EX1021, ¶¶30-32. As discussed above, it would have been an obvious alternative for a POSA to use a LAG between LSRs if there is a need to increase the bandwidth of the link between the LSRs. EX1021, ¶¶31-32. A POSA

IPR2023-00447 – Reply, p. 9

IPR2023-00447 – See Sur-Reply, pp. 2-4, 6-7, 16-17

Steptoe

Raz Would Be Inoperable for Its Intended Purpose: *Multiplexing*

- But: (3) Petitioner's Reply admits that a LAG between Raz's LSRs would obviate the need for Raz's invention altogether:

Reply:

increase the bandwidth of the link between the LSRs. EX1021, ¶¶31-32. A POSA would have understood that, if a LAG were available between LSRs, there would be no need to multiplex the packet streams transmitted between LSRs, as shown by Ferguson. EX1007, Cols. 1:28-2:3, Figures 2A-2B; EX1021, ¶¶31-32, 45.

IPR2023-00447 – Reply, p. 9

Legal Standard

- Single-reference obviousness nonetheless requires a showing of motivation to modify the reference.
 - *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1361 (Fed. Cir. 2016)
 - *SIBIA Neurosciences, Inc. v. Cadus Pharm. Corp.*, 225 F.3d 1349, 1356 (Fed. Cir. 2000)
- Obviousness analysis is insufficient where it does not explain specifically how the prior art would be modified or is not specific to the claim limitations.
 - *ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1327-28 (Fed. Cir. 2012)
- “[N]eed for specificity pervades our authority on the PTAB’s findings on motivation to combine.”
 - *In re NuVasive, Inc.*, 842 F.3d 1376, 1381-82 (Fed. Cir. 2016) (cleaned up)
- Motivation is not established where a party fails to explain “*how* the [modified prior art] was supposed to work.”
 - *PersonalWeb Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 993-94 (Fed. Cir. 2017) (emphasis in original))

The Petition's Showing for Motivation to Modify Raz Is Deficient

- The Petition fails to explain *why* or *how* Raz would be modified to use a LAG or to apply to communications between two MPLS/LAG switches as claimed
 - The Petition's analysis (i) never mentions “modify”; (ii) mentions “motivat[ion]” for only two assertions that already assume a LAG; (iii) relies merely on what “could” happen
 - The Petition repeatedly asserts that packets are communicated “the same way” both within and between routers/switches, but:
 - (i) this is wrong, including for “technical” differences and for inoperability discussed above; &
 - (ii) Petitioner fails to explain how the alleged modification would account for those differences
 - The Petition does not explain *why* or *how* Raz would be modified specifically to meet the claim requirement that the first switch sends a packet via the single physical tunnel port assigned by the first switch
- The Reply fails to remedy the Petition's deficiency, as it fails to identify any motivation in the Petition and again fails to explain *how* Raz's specific teachings would have been modified

The Petition's Showing for Motivation to Modify Raz Is Deficient

Reply:

PO also asserts that the Petition does not explain “*why* or *how* a POSA would have been motivated to modify Raz’s specific teachings to include a LAG between LSRs.” POR at 18 (emphasis in original). Wrong. The Petition explains that Raz’s system would have been modified to include a LAG between the LSRs, the modified system would select a physical tunnel port of the LAG to communicate a high-speed packet stream, and the modified system would use a data packet label to identify the selected physical tunnel port and communicate that label to a preceding node to allow the packet to be forwarded through the proper physical tunnel port. Paper 1 at 15, 19-20 and 22-25; EX1021, ¶38. As discussed above, these modifications would have been made is to increase available bandwidth. EX1021, ¶38.

IPR2023-00447 – Reply, p. 10

IPR2023-00447 – CITE (include Sur-Reply 19)

New Reply Declaration:

38. Further, Dr. Rouskas argues that the Petition “does not explain *why* or *how* a POSA would have been motivated to modify the specific teachings of Raz to include a LAG between LSRs.” EX2007, ¶70 (emphasis in original). I disagree. As explained in my original declaration and in other parts of this reply declaration, a POSA would have understood that the system of Raz would have been modified to include a LAG between the LSRs, the modified system would select a physical tunnel port of the LAG to communicate a high speed packet stream while maximizing the available bandwidth of the modified system, and the modified system would use a data packet label to identify the selected physical tunnel port and communicate that label to a preceding node to allow the packet to be communicated through the proper physical tunnel port.

IPR2023-00447 – Bhattacharjee Reply Decl. (Ex. 1021), ¶ 38

Ground 1 (Raz):

There Is No Reasonable Expectation of Success

IPR2023-00447 – See POR, pp. 24-25, 38, 15-16, 18-19; Sur-Reply, pp. 21-22, 16-18, 19-20

Steptoe

-57-

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Legal Standard

- Obviousness requires Petitioner to establish a reasonable expectation of success, and this requirement is separate and distinct from motivation to modify.
 - *Eli Lilly & Co. v. Teva Pharm. Int'l GmbH*, 8 F.4th 1331, 1344 (Fed. Cir. 2021)
- Single-reference obviousness nonetheless requires this showing of reasonable expectation of success.
 - *In re Stepan Co.*, 868 F.3d 1342, 1346 n.1 (Fed. Cir. 2017)
 - *Stryker Corp. v. OsteoMed LLC*, IPR2022-00191, Paper 35 at 41-44 (PTAB May 30, 2023)

The Petition Makes No Showing for Reasonable Expectation of Success

- The Petition contains **no arguments** for reasonable expectation of success

85. Based on my review, it is my opinion that Petitioner does not present any argument, much less a persuasive argument, regarding whether a POSA would have had a reasonable expectation of success in modifying Raz to meet the claims. There is no mention of any “reasonable expectation of success” in either the Petition or Dr. Bhattacharjee’s declaration, except for Dr. Bhattacharjee’s discussion of the applicable law. Ex.1004 ¶14.

IPR2023-00447 – Rouskas Decl. (Ex. 2007), ¶ 85

Petition's Reply Does Not and Cannot Remedy the Petition's Deficiency

- The Reply does not and cannot remedy the Petition's deficiency regarding reasonable expectation of success

Reply:

C. There is a Reasonable Expectation of Success in Modifying Raz.

PO argues that Petitioner does not address “a reasonable expectation of success in modifying Raz to meet the claims.” POR at 24-25. Not so. There is no requirement that the Petition use the exact words “reasonable expectation of success.” Here, the Petition and Dr. Bhattacharjee (who noted the need for a reasonable expectation of success, EX1004, ¶¶14, 17) explain why a POSA reasonably would have expected success in modifying the teachings of Raz to (1) use a physical tunnel port in an Ethernet LAG to communicate packet streams and (2) generate a data packet label identifying the physical tunnel port to be used. Paper 1 at 15, 19-20 and 22-25; EX1004, ¶¶82, 90-91 and 107-108; EX1021, ¶¶53-54. PO provides no evidence to the contrary.

IPR2023-00447 –
Reply, p. 12

- (i) This is an improper new Reply theory
 - *Netflix*, IPR2021-00542, Paper 34 at 36-40 (denying theories “not explicitly offered or explained” in the petition)
- (ii) The Reply's assertion is generic, not specific to the claims

Steptoe

IPR2023-00447 – See Sur-Reply, pp. 21-22

There Is No Reasonable Expectation of Success

- There is no reasonable expectation of success, because Raz would be inoperable if modified as Petitioner alleges

Dr. Rouskas:

86. Indeed, in my opinion, a POSA would not have had a reasonable expectation of success of modifying Raz's mechanism to meet the claims, as a POSA would not have even had a reasonable expectation of success of somehow applying Raz's mechanism to communications between two network devices (such as the claimed MPLS/LAG switches) to begin with. As explained in sections VIII.B–C above, Raz's mechanism involves several teachings that are incompatible with communications between network devices, and modifying of Raz to apply to such communications between network devices would render Raz inoperable or unsatisfactory for its intended purpose (i.e., its purpose of provisioning data across subports *within* a single network device).

IPR2023-00447 – Rouskas Decl. (Ex. 2007), ¶ 86 (referencing sections VIII.B–C)

IPR2023-00447 – See POR, pp. 25, 15-16, 18-19; Sur-Reply, pp. 22, 16-18, 19-20

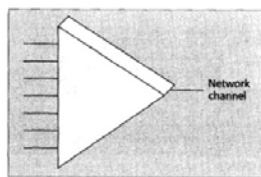
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There Is No Reasonable Expectation of Success

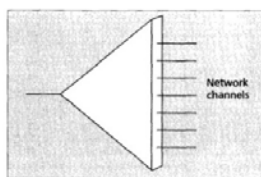
Dr. Rouskas:

described in section VIII.A above, a POSA would have understood that applying Raz's teachings regarding its subports to communications between two MPLS/LAG switches would have rendered Raz inoperable or unsatisfactory for its intended purpose.

61. As one example, a POSA would have understood that Raz involves multiplexing (which Raz refers to as "aggregating") the outputs of its slow-speed subports into a single high-speed stream. Raz at 1:1-8, 1:65-66, Abstract, 2:11-13,



■ Figure 1. Multiplexer symbol.



■ Figure 2. Inverse multiplexer.

63. As another example of why applying Raz's subport-related teachings to communications between two MPLS/LAG switches would have rendered Raz inoperable or unsatisfactory for its intended purpose, a POSA would have understood that Raz's forwarding and provisioning mechanism involves using the same subport for processing a data packet on both sides of a link between two LSRs. Raz at Fig. 3, 2:15-16, 6:38-41, 7:20, 8:46-47. Indeed, Raz teaches that

POSA would have known that how packets are processed and move within a switch is different from how packet streams are communicated between switches, for at least three technical reasons:

- 1) As soon as an Ethernet frame containing an MPLS packet arrives at a switch, the Ethernet header and trailer is stripped off (an operation called "decapsulation") and only the MPLS packet is stored in a buffer (memory location) within the switch. Therefore, the MPLS packet stored in the switch is different than the Ethernet frame sent between switches.
 - 2) Ethernet frames are serially transmitted bit-by-bit along each link; the Ethernet header and trailer are necessary so that the receiving switch will be able to determine where, in the stream of bits it receives, a frame starts and ends. Within a switch, on the other hand, there is no bit-by-bit transmission. Upon reception, each MPLS packet is stored individually in any memory location that is available at the time of its arrival; therefore, two MPLS packets transmitted in back-to-back Ethernet frames on the same link may be stored in two different and unrelated memory locations upon reception. To "move" a packet within a switch, a processor reads the packet from one memory location and copies it to another. Therefore, the "subports" of Raz are *not* transmission links. The processor of a subport simply *reads* a packet from the memory location where Raz's port forwarding module stored it.
 - 3) When communicating an Ethernet frame on a link between switches, the upstream switch serially transmits the bits of the entire frame. Ethernet frames (and the MPLS packets they contain) are of variable length, and switching variable-length packets is slow. Therefore, switches operating at Gigabit speeds, such as the switches of Raz and of the '602 patent, typically do not switch the MPLS packets in their entirety. Instead, at the input port they fragment the packets into small fixed-size cells and switch each cell separately; at the output port the cells are then reassembled into the original packet (in a buffer).
- Overall, the way an MPLS packet "moves" within a switch from the input port (where it is received from an Ethernet frame) to the output port (where it is reassembled to be forwarded to the downstream switch as another Ethernet frame) is completely different from, and unrelated to, how Ethernet frames are communicated (via serial bit-by-bit transmission) between switches.

IPR2023-00447 – Rouskas Decl. (Ex. 2007), ¶¶ 60-63, 72 (in sections VIII.B–C)

IPR2023-00447 – See POR, pp. 25, 15-16, 18-19; Sur-Reply, pp. 22, 16-18, 19-20

Steptoe

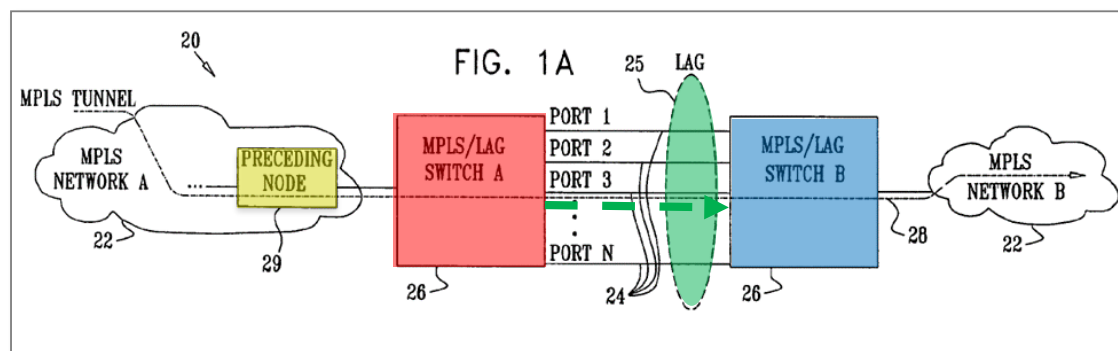
Ground 1 (Raz):

Raz Does Not Disclose or Render Obvious Claim 15's “mapper”

'602 Patent Claim 15 Requires a “mapper” Configured to Perform Limitations 15.6–15.8

Claim 15:

- 15.5 a mapper, which is configured to:
- 15.6 receive a data packet from an upstream node;
- 15.7 detect said data packet label in said data packet; and
- 15.8 if said data packet contains said data packet label, send said data packet to the second MPLS/LAG switch via said single physical tunnel port.



IPR2023-00447 – '602 Patent (Ex. 1001) at claim 15, Fig. 1A

IPR2023-00447 – See POR, pp. 3-4, 9-10, 43, 50; Sur-Reply, p. 22

Steptoe

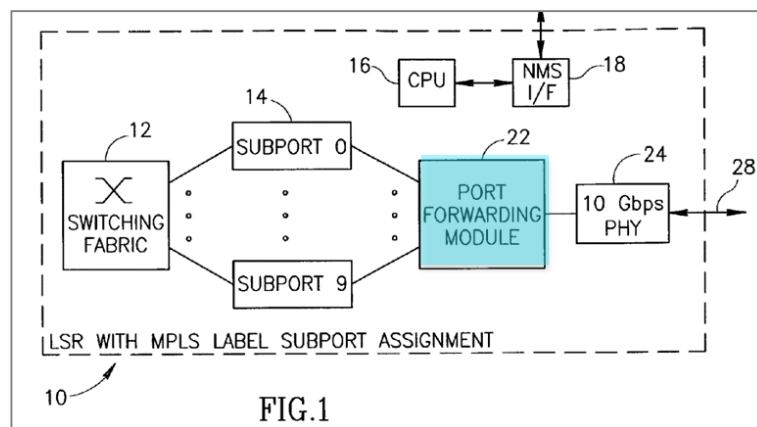
The Petition Fails to Show Raz's Forwarding Module Meets or Renders Obvious Limitations 15.6–15.8

Petition's only mention of Raz's forwarding module for claim 15:

forward the data packet in accordance with the label. Raz teaches a forwarding module that performs these functions and thus corresponds to the mapper recited in Element [15.5]. EX1006, Col. 7:30-58; *see id.*, Col. 9:29-58, Figures 3-4; EX1004,

IPR2023-00447 – Petition, pp. 45-46

Raz:



IPR2023-00447 – Raz
(Ex. 1006) at Fig. 1

Raz's Forwarding Module Cannot Be the "mapper"

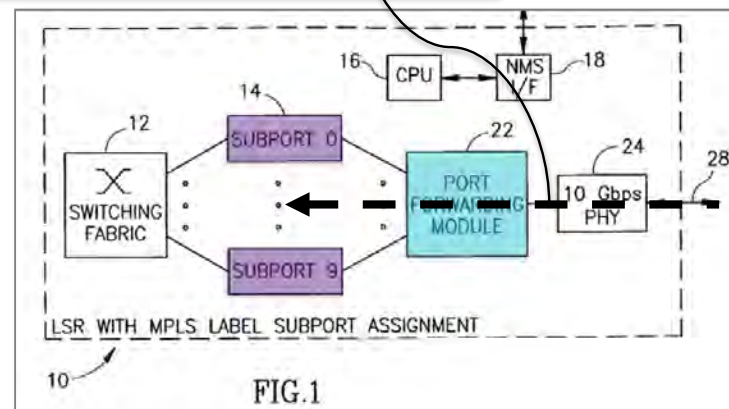
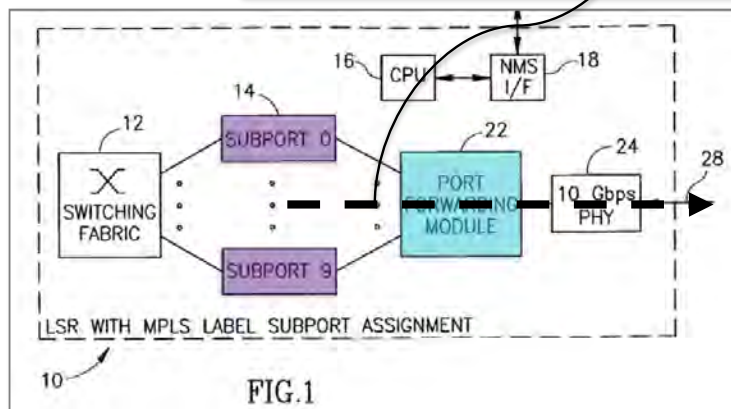
Claim 15:

15.5 a mapper, which is configured to:
15.6 receive a data packet from an upstream node;
15.7 detect said data packet label in said data packet; and
15.8 if said data packet contains said data packet label, send said data packet to the second MPLS/LAG switch via said single physical tunnel port.

IPR2023-00447 – '602 Patent (Ex. 1001) at claim 15

Raz:

subports, the subport forwarding module further comprises means for forwarding outbound packets from the subports to the line-interface and for forwarding inbound packets from the line interface to one of the plurality of subports in accordance with the label of each inbound packet.



IPR2023-00447 – Raz (Ex. 1006) at 3:28-32, Fig. 1

IPR2023-00447 – See POR, pp. 3-4, 44-50; Sur-Reply, pp. 22-23

Steptoe

Petitioner's Reply Advances New Argument

- The Reply contains new argument and evidence regarding Raz's port forwarding module for:
 - limitations 15.6–15.8
 - obviousness
- This should be disregarded

Raz discloses that the "port forwarding module" can be implemented on a network processor, FPGA or ASIC, and the port forwarding module performs the functions of the claimed mapper. EX1006, Cols. 6:65-7:5, 7:30-58, 12:61-13:5, Figures 1, 6; EX1021, ¶¶82-84. For example, Limitation [15.6] recites that the claimed mapper must "receive a data packet from an upstream node," and Raz discloses that "[t]he port forwarding module functions to receive the 10G packet stream..." EX1006, Col. 7:42-51. Further, Limitation [15.7] requires that the mapper must "detect said data packet label in said data packet," and Raz states that the port forwarding module "examine[s] the label in each packet." *Id.* Further, Limitation [15.8] claims that, based on the data packet label, the mapper "send[s] said data packet to the second MPLS/LAG switch via said single physical tunnel port." Raz discloses that its port forwarding module forwards the packet "to one of the subports

in accordance with the label." EX1006, Col. 7:51-52; *see id.*, Col 7:42-45. Thus, the port forwarding module is inspecting the data packet label, determining the subport to which the data packet should be sent, and forwarding the data packet to that subport. EX1021, ¶¶85-87. It would have been obvious to a POSA that the port forwarding module could also be applied to select a physical tunnel port over which to send a data packet from LSR B (corresponding to the first MPLS/LAG switch) to the next LSR (corresponding to the second MPLS/LAG switch). *Id.* As such, Raz's port forwarding module corresponds to the claimed mapper performing the functions recited in Limitations [15.6]-[15.8]. *Id.*

PO also argues that the subport forwarding module "just directs such a received data packet to a subport within the LSR for processing." POR at 45-48. This argument ignores that a POSA would have understood that the techniques used to forward packets within an LSR also could be applied to a LAG communicating a high-speed packet stream between LSRs. EX1021, ¶88. For example, the subport forwarding module of Raz could have been applied as a mapper to select a physical tunnel port of a LAG between LSRs (or MPLS/LAG switches). *Id.*

IPR2023-00447 – Reply, pp. 17-18

IPR2023-00447 – See POR, pp. 43-44, 48; Sur-Reply, pp. 3-4, 22-23

Steptoe

Petitioner's New Reply Argument Fails

- Even if considered, the Reply's new obviousness arguments are conclusory and fail to explain specifically why or how Raz's forwarding module would be modified to apply to a LAG

subport. EX1021, ¶¶85-87. It would have been obvious to a POSA that the port forwarding module could also be applied to select a physical tunnel port over which to send a data packet from LSR B (corresponding to the first MPLS/LAG switch) to the next LSR (corresponding to the second MPLS/LAG switch). *Id.* As such, Raz's port forwarding module corresponds to the claimed mapper performing the functions recited in Limitations [15.6]-[15.8]. *Id.*

PO also argues that the subport forwarding module "just directs such a received data packet to a subport within the LSR for processing." POR at 45-48. This argument ignores that a POSA would have understood that the techniques used to forward packets within an LSR also could be applied to a LAG communicating a high-speed packet stream between LSRs. EX1021, ¶88. For example, the subport forwarding module of Raz could have been applied as a mapper to select a physical tunnel port of a LAG between LSRs (or MPLS/LAG switches). *Id.*

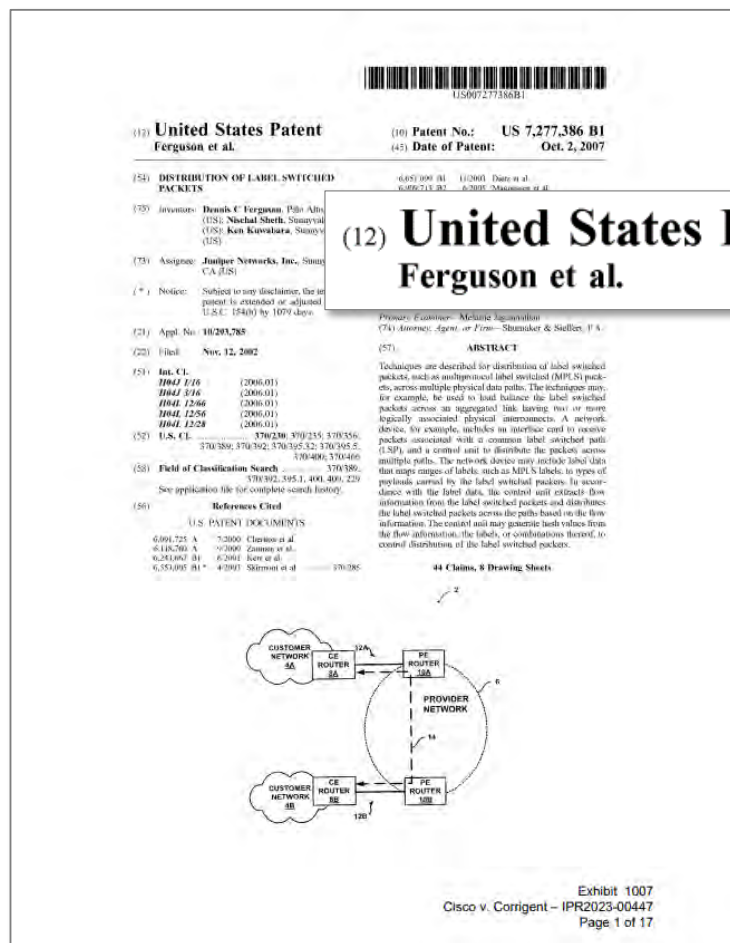
IPR2023-00447 –
Reply, p. 18

Ground 2 (Raz in view of Ferguson):

Overview of Ground 2

Ground 2 (Raz in view of Ferguson):

- *Roadmap for Ground 2*
 - Ground 2 does not cure the problems with Ground 1
 - POSA would not modify Raz based on Ferguson
 - There is no reasonable expectation of success



IPR2023-00447 – Ferguson (Ex. 1007), p. 1

(12) **United States Patent**
Ferguson et al.

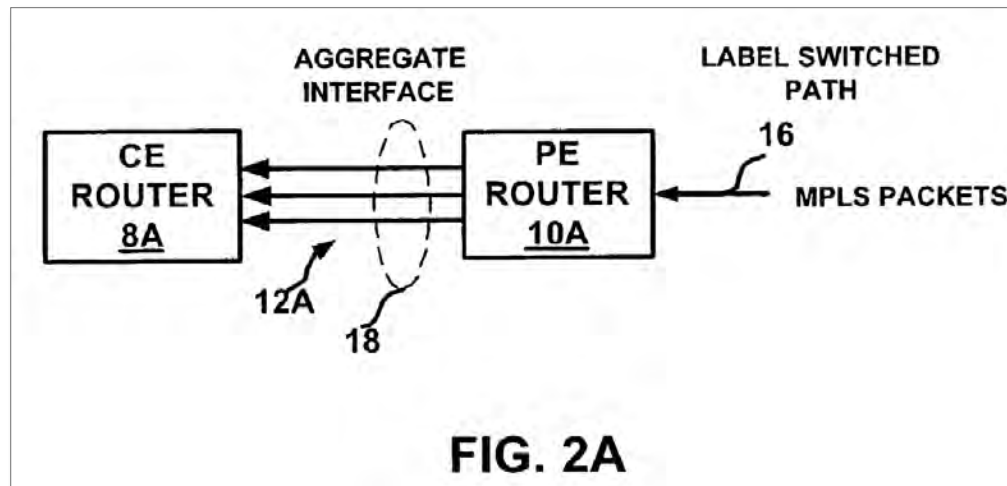
(10) **Patent No.:** US 7,277,386 B1
(45) **Date of Patent:** Oct. 2, 2007

(54) **DISTRIBUTION OF LABEL SWITCHED PACKETS**

(75) Inventors: **Dennis C Ferguson**, Palo Alto, CA
(US); **Nischal Sheth**, Sunnyvale, CA
(US); **Ken Kuwabara**, Sunnyvale, CA
(US)

(73) Assignee: **Juniper Networks, Inc.**, Sunnyvale,
CA (US)

Ferguson



IPR2023-00447 – Ferguson (Ex. 1007) at Fig. 2A

Petition:

Ferguson discloses the utilization of an Ethernet physical data port in a LAG in an MPLS network for the purpose of communicating high-speed packet streams. EX1007, Cols. 1:21-26, 1:43-53, 3:36-4:19, 6:10-31, Figures 2A-2C; EX1004, ¶244. As shown below in Figures 2A-2C of Ferguson, MPLS packets are communicated along a physical interconnect that is part of an “aggregate interface” (i.e., a LAG) between ports on two routers:

IPR2023-00447 – Petition, p. 53

IPR2023-00447 – See POR, pp. 52-58, 60; Sur-Reply, p. 24

Steptoe

Petitioner Asserts that Ferguson Provides Motivation to Apply Raz to Communications Between LSRs

Petition:

Claims 1-26 obvious. With respect to Raz, Petitioner incorporates by reference the analysis of the obviousness of Claims 1-13, 15-24 and 26 set forth above in Ground 1. See above Section IX; EX1004, ¶¶78-239.

Ferguson teaches a POSA that the method of assigning a subport with appropriate bandwidth within the LSR that is disclosed in Raz could also be implemented between MPLS/LAG switches in an MPLS network. See, e.g., *id.*, ¶245. That is, to the extent that it was not already obvious from Raz, a POSA reviewing Ferguson would have understood that it would be desirable to implement the techniques in Raz for assigning a physical tunnel subport within an LSR to assign a physical tunnel port to communicate packets along “physical interconnects” between “two switches” in an MPLS network. EX1007, Col. 1:22-27, 1:57-66; EX1004, ¶245.

Ferguson would have taught a POSA that the method of assigning a subport with appropriate bandwidth within the LSR of Raz could also be implemented between network devices (such as MPLS/LAG switches) in an MPLS network.

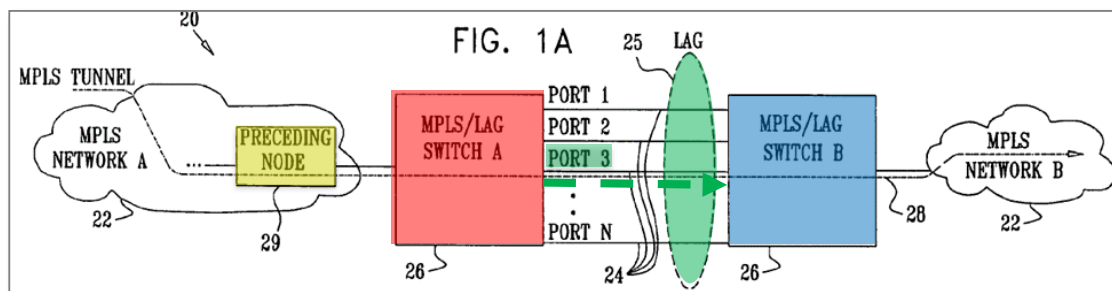
IPR2023-00447 –
Petition, pp. 52-53, 55

Ground 2 (Raz in view of Ferguson):

Ground 2 Fails Even If Raz is Modified Based on Ferguson

The Claims Are Not Rendered Obvious Even If Raz Is Modified Based on Ferguson

- Even if Raz is applied to communications between LSRs based on Ferguson, Ground 2 still fails for reasons discussed for Ground 1:
 - Ground 2 still fails to meet limitation 1.5 (i.e., sending via a single physical tunnel port that is assigned and labeled by the first switch)



- Ground 2 still fails to meet claim 15, as it does not address Raz's forwarding module or limitations 15.5–15.8

a mapper, which is configured to:

receive a data packet from an upstream node;

detect said data packet label in said data packet; and

if said data packet contains said data packet label, send said data packet to the second MPLS/LAG switch via said single physical tunnel port.

IPR2023-00447 –
'602 Patent (Ex.
1001) at Fig. 1A,
claim 15

Ground 2 (Raz in view of Ferguson):

**There Is No Motivation to Modify Raz
Based on Ferguson to Arrive at the
'602 Patent's Invention**

IPR2023-00447 – See POR, pp. 51-64, 2-4, 6, 9-10, 12-13; Sur-Reply, pp. 23-25, 14

Steptoe

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Legal Standard

- Obviousness analysis is insufficient where it is not tied to the claim limitations or does not explain specifically how the references would work together to meet the limitations.
 - *ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1327-28 (Fed. Cir. 2012)
- “[N]eed for specificity pervades our authority on the PTAB’s findings on motivation to combine.”
 - *In re NuVasive, Inc.*, 842 F.3d 1376, 1381-82 (Fed. Cir. 2016) (cleaned up)
- Motivation is not established where a party fails to explain “*how* the combination of the two references was supposed to work.”
 - *PersonalWeb Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 993-94 (Fed. Cir. 2017) (emphasis in original))
- “[Party] failed to prove ... why the prior art references would have worked together.”
 - *Braintree Labs., Inc. v. Novel Labs., Inc.*, 749 F.3d 1349, 1359 (Fed. Cir. 2014) (cleaned up)

Legal Standard

“[H]indsight bias” cannot be “the thread that stitches together prior art patches into something that is the claimed invention.”

– *Metalcraft of Mayville, Inc. v. Toro Co.*, 848 F.3d 1358, 1367 (Fed. Cir. 2017).

The Petition Fails to Explain *Why* or *How* Raz Would Be Modified Based on Ferguson to Meet All Claim Limitations

- The Petition's analysis is not specific to the claim limitations

X. GROUND 2: CLAIMS 1-26 ARE UNPATENTABLE AS OBVIOUS OVER THE COMBINATION OF RAZ, FERGUSON AND THE KNOWLEDGE OF A POSA.

The combination of Raz and Ferguson (neither of which were considered during prosecution of the '602 Patent), along with the knowledge of a POSA, renders Claims 1-26 obvious. With respect to Raz, Petitioner incorporates by reference the analysis of the obviousness of Claims 1-13, 15-24 and 26 set forth above in Ground

1. See above Section IX; EX1004, ¶¶78-239.

Claims 1, 15 and 26 –

Motivation to Combine Raz and Ferguson –

IPR2023-00447 – Petition, pp. 52, 56

IPR2023-00447 – See POR, p. 57

Steptoe

The Petition Fails to Explain *Why* or *How* Raz Would Be Modified Based on Ferguson to Meet All Claim Limitations

- The Petition merely argues that a POSA could have applied Raz's internal techniques to communications between LSRs based on Ferguson, without addressing Raz's specific teachings, much less explaining (i) specifically *why* or *how* this modification would be done or (ii) how it would meet all claim limitations

Ferguson teaches a POSA that the method of assigning a subport with appropriate bandwidth *within* the LSR that is disclosed in Raz could also be implemented *between* MPLS/LAG switches in an MPLS network. *See, e.g., id.*, ¶245. That is, to the extent that it was not already obvious from Raz, a POSA reviewing Ferguson would have understood that it would be desirable to implement the techniques in Raz for assigning a physical tunnel subport within an LSR to assign a physical tunnel port to communicate packets along “physical interconnects” between “two switches” in an MPLS network. EX1007, Col. 1:22-27, 1:57-66; EX1004, ¶245.

Ferguson would have taught a POSA that the method of assigning a subport with appropriate bandwidth within the LSR of Raz could also be implemented between network devices (such as MPLS/LAG switches) in an MPLS network.

same way within a device as between devices. *Id.* Thus, a POSA would have understood that the techniques disclosed in Raz for forwarding packets using physical subports within a LSR in an MPLS network could also be applied when communicating packets from a physical port on one MPLS/LAG switch to a physical port on another MPLS/LAG switch. *Id.*

and vice versa. EX1004, ¶250; EX1007, Cols. 5:61-6:6. Armed with this understanding, a POSA would have known that the techniques disclosed in Raz for using subports to transmit data packets within a router or switch would also have been applicable to an Ethernet physical data port in a LAG that communicates data packets between routers or switches in an MPLS network. EX1004, ¶250. As such,

IPR2023-00447 – Petition, pp. 53, 55-56, 59

IPR2023-00447 – See POR, pp. 57-64

Steptoe

Petitioner's Reply Also Fails to Explain *Why* or *How* Raz Would Be Modified Based on Ferguson to Meet All Claim Limitations

- Petitioner's Reply for Ground 2 likewise argues in conclusory fashion that Raz "could be applied ... between LSRs," without explaining *why* or *how* Raz would be modified in view of Ferguson to meet the claim limitations

as discussed above in Ground 1, it would have been obvious to a POSA that Raz's techniques could be applied to communications on links between LSRs. EX1021,

IPR2023-00447 – Reply, p. 19

- In fact, Petitioner's expert concedes:

provisioning discussed in Ferguson. I have not provided an opinion that Raz's method of label provisioning should be changed in light of Ferguson.

IPR2023-00447 – Bhattacharjee Reply Decl. (Ex. 1021), ¶ 104

Ferguson's Relied-Upon Disclosure Does Not Motivate a POSA to Apply Raz Between LSRs

Petition:

A POSA would have understood from the disclosures in Ferguson that techniques for utilizing an Ethernet physical data port in a LAG to communicate data packets between routers or switches in an MPLS network are also applicable to the use of subports transmitting the data packets within the routers or switches, and vice versa. EX1004, ¶250; EX1007, Cols. 5:61-6:6. Armed with this

IPR2023-00447 – Petition, p. 59

Ferguson:

In this manner, the devices of system 2 make use of the allocated ranges of MPLS labels to control the distribution of MPLS packets across multiple physical paths. Although the techniques have been described in reference to distribution of MPLS packets across parallel physical interconnects of an aggregated link, the techniques may be applied in a variety of environments. For example, the techniques may be readily applied to internal parallel data paths within a device. For example, the techniques may be used by a router to distribute packets across internal data paths that begin at the same input interface of the router and end at the same output interface of the router, but traverse through different internal, high-speed switch fabrics. A control unit for the

IPR2023-00447 – Ferguson (Ex. 1007) at 5:61-6:6

- This relied-upon disclosure from Ferguson:
 - 1) is specific to *Ferguson's* techniques, **not applicable to Raz**
 - 2) teaches that its *external* techniques may be applied *within* a router, **not vice versa**

IPR2023-00447 – See POR, pp. 53, 60-64; Sur-Reply, p. 24

Steptoe

Ferguson's Relied-Upon Disclosure Does Not Motivate a POSA to Apply Raz Between LSRs

Petitioner:

- Petitioner and its expert recognize that Ferguson's relied-upon disclosure:
 - (1) is about Ferguson's own techniques
 - (2) teaches that Ferguson's external techniques may be applied within a device

switches in a MPLS network. EX1007, Cols. 5:61-6:6; EX1004, ¶245. Ferguson states that “[a]lthough [its] techniques have been described in reference to distribution of MPLS packets across parallel physical interconnects of an aggregated link, the techniques may be applied in a variety of environments.” EX1007, Col. 5:63-67. “For example, the techniques may be readily applied to internal parallel data paths within a device.” *Id.*, Cols. 5:67-6:2. “For example, the techniques may

IPR2023-00447 – Petition, p. 55

Q. So there it's referring to techniques in Ferguson that have been described for communicating packets across physical interconnects of an aggregated link and saying that -- that those may be readily applied to internal data paths within a device, correct?

A. I think you just reread that, but that's correct.

Dr. Bhattacharjee:

IPR2023-00447 – Bhattacharjee Dep. (Ex. 2008) at 72:4-11

IPR2023-00447 – See POR, pp. 60-63

Steptoe

Ferguson's Relied-Upon Disclosure Does Not Motivate a POSA to Apply Raz Between LSRs

- Petitioner's Reply responds by citing a single conclusory paragraph of its new expert declaration

Reply:

98. It would have been obvious to a POSA that Ferguson teaches that the aggregation principles used outside of a router or switch can also be applied inside of a router or switch. EX1021, ¶97. Indeed, PO admits that “Ferguson’s techniques can apply to both between and within routers.” POR at 63. The opposite also would have been obvious in light of Ferguson – that Raz’s aggregation techniques used with subports in an LSR could be applied to links between LSRs. EX1021, ¶97.

IPR2023-00447 – Reply, p. 20

New Reply Declaration:

and vice versa. EX1004, ¶¶245, 250, 300. The teachings of Ferguson would have motivated a POSA to take the techniques used to communicate packets within the LSR of Raz and use them to communicate packets between LSRs or switches in the same MPLS network. Further, I note that this disclosure in Ferguson undermines Dr.

IPR2023-00447 – Bhattacharjee Reply Decl. (Ex. 1021), ¶ 97

IPR2023-00447 – See Sur-Reply, pp. 23-24

Steptoe

In fact, Raz's Mechanism Is Specifically for Inside an LSR and Teaches Away from External Use

Further, it is intended that the mechanism of the present invention be implemented in network devices such as routers (e.g., LSRs in MPLS networks) making up the nodes in a network and include edge nodes and intermediate nodes. It is

BACKGROUND OF THE INVENTION

capable of handling large and larger amounts of traffic. A problem arises, however, when the aggregate link speeds exceed the capacity of the internal circuits used to process the inbound and outbound packet streams. For example, consider

There is thus a need for a forwarding and provisioning mechanism that enables a high speed packet stream to be processed by multiple processors that operate at a slower rate than the inbound packet stream. The mechanism should be

SUMMARY OF THE INVENTION

The present invention provides a link multiplexing mechanism utilizing path oriented forwarding. The mechanism comprises a subport forwarding and provisioning mechanism whereby a plurality of subports comprising slower speed processors are used to perform the packet processing for a higher speed packet stream. To provide the flexibility

ABSTRACT

A subport forwarding and provisioning mechanism whereby a plurality of subports implemented using slower speed processors are used to perform the packet processing for a higher speed packet stream. Outbound packets are assigned a sub-

DETAILED DESCRIPTION OF THE INVENTION

The present invention provides a subport forwarding and provisioning mechanism whereby a plurality of subports comprising slower speed processors are used to perform the packet processing for a higher speed packet stream. To pro-

IPR2023-00447 – Raz (Ex. 1006) at 6:51-54, 1:43-46, 1:56-59, 1:65-2:3, Abstract, 6:24-27

IPR2023-00447 – See POR, pp. 52-53, 12-13; Sur-Reply, pp. 23, 14

Steptoe

Raz and Ferguson Address Different Problems

- Raz's problem is how to handle a high-speed link with slow-speed processors within an LSR

Raz:

The present invention provides a subport forwarding and provisioning mechanism whereby a plurality of **subports comprising slower speed processors** are used to perform the packet processing for a **higher speed packet stream**. To pro-

IPR2023-00447 –
Raz (Ex. 1006) at
6:24-27

- Ferguson is about distributing packets across multiple paths or interconnects (e.g., for load balancing), which assumes that the routers have sufficient processing capacity, so Raz's problem is not an issue

Ferguson:

Techniques are described for distribution of label switched packets, such as multiprotocol label switched (MPLS) packets, across multiple physical data paths. The techniques may, for example, be used to **load balance** the label switched packets across an **aggregated link** having two or more logically associated physical interconnects. A network

IPR2023-00447 –
Ferguson (Ex. 1007)
at 1:57-63

- In fact, Ferguson discloses routers with “high-speed” components

Ferguson:

internal **high-speed** switching components

internal, **high-speed** switch fabrics

IPR2023-00447 –
Ferguson (Ex. 1007)
at 2:51-52, 6:6

IPR2023-00447 – See POR, pp. 53-54; Sur-Reply, p. 24

Steptoe

Raz and Ferguson Use Different Methods

- Raz and Ferguson teach different methods regarding how to handle LSPs

that Raz and Ferguson use fundamentally different methods. A POSA would have understood that **Ferguson** teaches that packets of a single common LSP are distributed across multiple paths or interconnects of an aggregated link. Ferguson at Abstract, Figs. 2A-2C, 1:57-66, 2:4-6, 2:27-34, 2:40-43, claim 1. But a POSA would have understood that **Raz's** provisioning mechanism, in contrast, teaches that all packets of a given LSP are assigned to the same particular subport in a group of subports, and that different LSPs can be provisioned for different subports in the group. Raz at 7:17-19, 7:26-45, 8:56-58, 9:41-10:4, 11:36-38. This

IPR2023-00447 – Rouskas Decl. (Ex. 2007), ¶ 144

- Raz and Ferguson also teach different methods regarding label provisioning

POSA would have understood that **Raz** emphasizes that its subport assignment and label generation comes from downstream, as Raz teaches that a receiving LSR selects a subport, generates a label indicating that subport, and sends that label to an upstream device. Raz at 7:26-38, 8:52-55, 9:41-58. For example, for Raz's

POSA would have understood that **Ferguson** instead teaches that a given router transmits a packet based on the existing label(s) of that packet or selects and prepends its own label to the packet. See Ferguson at 2:4-26, 3:53-4:8, 8:29-57

IPR2023-00447 – Rouskas Decl. (Ex. 2007), ¶ 145

IPR2023-00447 – See POR, pp. 54-56; Sur-Reply, p. 24

Steptoe

The Reply's Pivot to Bandwidth Fails to Establish Motivation

- Petitioner's Reply pivots to the issue of bandwidth

Reply:

PO asserts that Ferguson and Raz “address different problems” and “use fundamentally different methods.” POR at 53-56. Not so. EX1021, ¶¶99-105. As explained in the Petition, both Ferguson and Raz are directed to solving the problem of ensuring enough **bandwidth** is available to communicate high-speed packet streams through an MPLS network. Paper 1 at 56-59; **EX1006, Cols. 10:60-11:12, 14:33-41; EX1007, Cols. 1:28-42, 2:54-57, 4:55-60.** Ferguson, like Raz, focuses on improving the use of **bandwidth** when using a LAG in an MPLS network. EX1006,

IPR2023-00447 – Reply, pp. 20-21

- But Petitioner mischaracterizes Raz, which concerns allocating bandwidth of **processors within** an LSR, not **links between** LSRs

– This is shown by:

Raz:

The invention provides a scheme for **allocating LSP bandwidth to subports** that helps in solving the problem described

IPR2023-00447 – Raz (Ex. 1006) at 11:3-4

Petition:

Raz discusses allocating the bandwidth of subports within an LSR

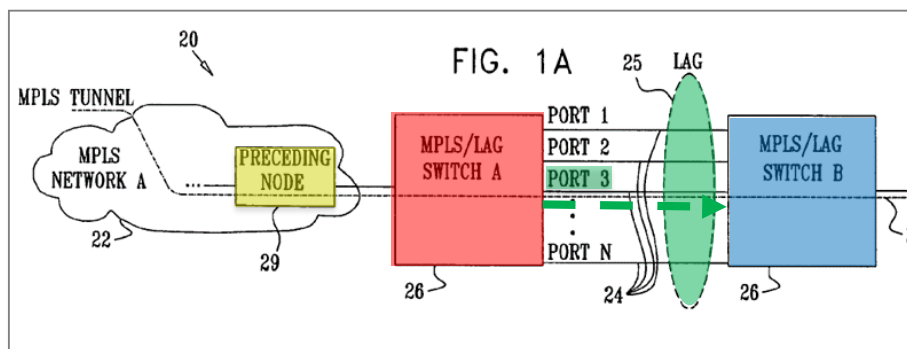
IPR2023-00447 – Petition, p. 57

IPR2023-00447 – See POR, p. 62; Sur-Reply, pp. 24-25

Steptoe

The Reply's Pivot to Bandwidth Fails to Establish Motivation

- Petitioner's generic references to "bandwidth" do not establish motivation
 - *ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1327-28 (Fed. Cir. 2012) (finding alleged motivation "insufficient" where it "is generic and bears no relation to any specific combination of prior art elements" and "also fails to explain why a [POSA] would have combined elements from specific references *in the way the claimed invention does*" (emphasis in original))



What is claimed is:

1. A method for assigning and utilizing an Ethernet physical data port in an Ethernet Link Aggregation Group (LAG) in a Multi-Protocol Label Switching (MPLS) network, the method comprising the steps of:

assigning, by a first MPLS/LAG switch, a single physical tunnel port of a LAG to a network tunnel, wherein the single physical tunnel port of the LAG meets a bandwidth requirement of the network tunnel, and wherein said single physical tunnel port of the LAG has a port serial number;

dedicating a sub-set of bits in a data packet label prepared by the first MPLS/LAG switch to encode said port serial number of said single physical tunnel port of the LAG into the data packet label;

sending, by said first MPLS/LAG switch, the data packet label, in which said port serial number of said single physical tunnel port is encoded, to a preceding node;

receiving from the preceding node, by said first MPLS/LAG switch, a data packet comprising said data packet label, in which said port serial number of said single physical tunnel port is encoded; and

sending said data packet from said first MPLS/LAG switch to a second MPLS/LAG switch via said single physical tunnel port having the port serial number encoded in the data packet label.

IPR2023-00447 – '602 Patent (Ex. 1001) at Fig. 1A, claim 1

Ground 2 (Raz in view of Ferguson):

**There Is No Reasonable Expectation
of Success**

IPR2023-00447 – See POR, pp. 64-65, 15-16, 18-19; Sur-Reply, pp. 25, 16-18, 19-20

Steptoe

-90-

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Legal Standard

- Obviousness requires Petitioner to establish a reasonable expectation of success, and this requirement is separate and distinct from motivation to modify.
 - *Eli Lilly & Co. v. Teva Pharm. Int'l GmbH*, 8 F.4th 1331, 1344 (Fed. Cir. 2021)

The Petition Makes No Showing for Reasonable Expectation of Success

- The Petition contains **no arguments** for reasonable expectation of success

166. Based on my review, it is my opinion that Petitioner does not present any argument, much less a persuasive argument, regarding whether a POSA would have had a reasonable expectation of success in modifying Raz to meet the claims. There is no mention of any “reasonable expectation of success” in either the Petition or Dr. Bhattacharjee’s declaration, except for the Dr. Bhattacharjee’s discussion of the applicable law. Ex.1004 ¶14.

IPR2023-00447 – Rouskas Decl. (Ex. 2007), ¶ 166

Petition's Reply Does Not and Cannot Remedy the Petition's Deficiency

- The Reply does not and cannot remedy the Petition's deficiency regarding reasonable expectation of success

Reply:

C. Petitioner Establishes a Reasonable Expectation of Success.

PO argues that “Petitioner presents no argument that a POSA would have had a reasonable expectation of success in modifying Raz with Ferguson to meet the claims.” POR at 64-65. While there is no requirement that the Petition use the exact words “reasonable expectation of success,” the Petition explains why a POSA reasonably would have expected success in modifying the teachings of Raz in view of the teachings of Ferguson. Paper 1 at 55-59; EX1021, ¶¶120-121. PO provides no argument to the contrary.

IPR2023-00447 – Reply, pp. 23-24

There Is No Reasonable Expectation of Success

- There is no reasonable expectation of success, because Raz would be inoperable if modified as Petitioner alleges

Dr. Rouskas:

167. Indeed, in my opinion, a POSA would not have had a reasonable expectation of success of modifying Raz's mechanism based on Ferguson to meet the claims, as a POSA would not have even had a reasonable expectation of success of somehow applying Raz's mechanism to communications between two network devices (such as the claimed MPLS/LAG switches) to begin with, even in view of Ferguson. As explained in sections VIII.B–C above, Raz's mechanism involves several teachings that are incompatible with communications between network devices, and modifying of Raz to apply to such communications between network devices would render Raz inoperable or unsatisfactory for its intended purpose (i.e., its purpose of provisioning data across subports *within* a single network device). A POSA would have understood that combining Raz with Ferguson as Petitioner asserts would not have cured these issues.

IPR2023-00447 – Rouskas Decl. (Ex. 2007), ¶ 167 (referencing sections VIII.B–C)

IPR2023-00447 – See POR, pp. 65, 15-16, 18-19; Sur-Reply, pp. 16-18, 19-20

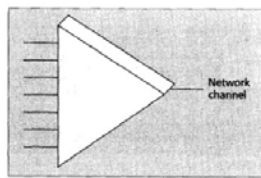
Steptoe

There Is No Reasonable Expectation of Success

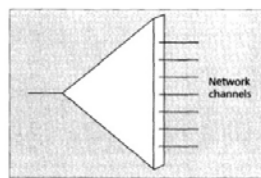
Dr. Rouskas:

described in section VIII.A above, a POSA would have understood that applying Raz's teachings regarding its subports to communications between two MPLS/LAG switches would have rendered Raz inoperable or unsatisfactory for its intended purpose.

61. As one example, a POSA would have understood that Raz involves multiplexing (which Raz refers to as "aggregating") the outputs of its slow-speed subports into a single high-speed stream. Raz at 1:1-8, 1:65-66, Abstract, 2:11-13,



■ Figure 1. Multiplexer symbol.



■ Figure 2. Inverse multiplexer.

63. As another example of why applying Raz's subport-related teachings to communications between two MPLS/LAG switches would have rendered Raz inoperable or unsatisfactory for its intended purpose, a POSA would have understood that Raz's forwarding and provisioning mechanism involves using the same subport for processing a data packet on both sides of a link between two LSRs. Raz at Fig. 3, 2:15-16, 6:38-41, 7:20, 8:46-47. Indeed, Raz teaches that

POSA would have known that how packets are processed and move within a switch is different from how packet streams are communicated between switches, for at least three technical reasons:

1) As soon as an Ethernet frame containing an MPLS packet arrives at a switch, the Ethernet header and trailer is stripped off (an operation called "decapsulation") and only the MPLS packet is stored in a buffer (memory location) within the switch. Therefore, the MPLS packet stored in the switch is different than the Ethernet frame sent between switches.

2) Ethernet frames are serially transmitted bit-by-bit along each link; the Ethernet header and trailer are necessary so that the receiving switch will be able to determine where, in the stream of bits it receives, a frame starts and ends. Within a switch, on the other hand, there is no bit-by-bit transmission. Upon reception, each MPLS packet is stored individually in any memory location that is available at the time of its arrival; therefore, two MPLS packets transmitted in back-to-back Ethernet frames on the same link may be stored in two different and unrelated memory locations upon reception. To "move" a packet within a switch, a processor reads the packet from one memory location and copies it to another. Therefore, the "subports" of Raz are *not* transmission links. The processor of a subport simply *reads* a packet from the memory location where Raz's port forwarding module stored it.

3) When communicating an Ethernet frame on a link between switches, the upstream switch serially transmits the bits of the entire frame. Ethernet frames (and the MPLS packets they contain) are of variable length, and switching variable-length packets is slow. Therefore, switches operating at Gigabit speeds, such as the switches of Raz and of the '602 patent, typically do not switch the MPLS packets in their entirety. Instead, at the input port they fragment the packets into small fixed-size cells and switch each cell separately; at the output port the cells are then reassembled into the original packet (in a buffer).

Overall, the way an MPLS packet "moves" within a switch from the input port (where it is received from an Ethernet frame) to the output port (where it is reassembled to be forwarded to the downstream switch as another Ethernet frame) is completely different from, and unrelated to, how Ethernet frames are communicated (via serial bit-by-bit transmission) between switches.

IPR2023-00447 – Rouskas Decl. (Ex. 2007), ¶¶ 60-63, 72 (in sections VIII.B–C)

IPR2023-00447 – See POR, pp. 65, 15-16, 18-19; Sur-Reply, pp. 16-18, 19-20

Steptoe

Summary

- *Ground 1 – Raz*
 - Raz fails to disclose or render obvious:
 - a LAG
 - a first switch assigning a single physical tunnel port for *sending* to a second switch
 - POSA would not and could not apply Raz between MPLS/LAG switches, let alone modify Raz to arrive at the claimed invention
 - There is no reasonable expectation of success
 - Claim 15's "mapper" is not satisfied
- *Ground 2 – Raz in view of Ferguson*
 - Ground 2 does not cure the problems with Ground 1
 - POSA would not modify Raz based on Ferguson
 - There is no reasonable expectation of success
- *Recurring Problems with Petitioner's Reply*
 - New Reply arguments and evidence
 - Improper "design choice" arguments