

JUNIPER NETWORKS, INC.,
v.
MONARCH NETWORKING SOLUTIONS LLC

Monarch's Trial Presentation

IPR2024-00561
US Patent No. 8,130,775

May 12, 2025

Outline

- **'775 Patent Overview and Background**
- **Ground 1 - Wainner and Bocci**
- **Ground 2 - Kamite and Bocci**

Outline

- **'775 Patent Overview and Background**
- **Ground 1 - Wainner and Bocci**
- **Ground 2 - Kamite and Bocci**

Background – Pseudo-Wire

1.1. Pseudo Wire Definition

PWE3 is a mechanism that emulates the essential attributes of a telecommunications service (such as a T1 leased line or Frame Relay) over a PSN. PWE3 is intended to provide only the minimum necessary functionality to emulate the wire with the required degree of faithfulness for the given service definition. Any required

From the perspective of Customer Edge Equipment (CE), the PW is characterized as an **unshared link** or circuit of the chosen service. In some cases, there may be deficiencies in the PW emulation that impact the traffic carried over a PW and therefore limit the applicability of this technology. These limitations must be fully described in the appropriate service-specific documentation.

1.2. PW Service Functionality

PWs provide the following functions in order to emulate the behavior and characteristics of the native service.

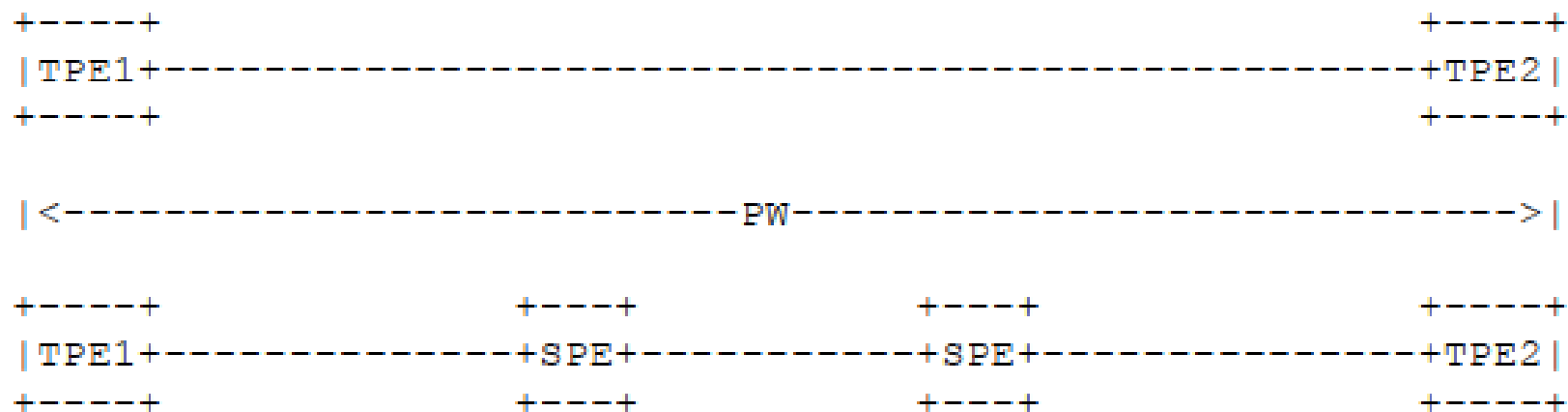
- o Encapsulation of service-specific PDUs or circuit data arriving at the PE-bound port (logical or physical).

Background – Multi-Segment Pseudo-Wire

- o Multi-Segment Pseudo Wire (MS-PW). A static or dynamically configured set of two or more contiguous PW segments that behave and function as a single point-to-point PW. Each end of a MS-PW by definition MUST terminate on a T-PE.
- o PW Segment. A part of a single-segment or multi-segment PW, which is set up between two PE devices, T-PEs and/or S-PEs.

2. Applicability

A MS-PW is a single PW that for technical or administrative reasons is segmented into a number of concatenated hops. From the perspective of a T-PE, a MS-PW is indistinguishable from a SS-PW. Thus, the following are equivalent from the perspective of the T-PE

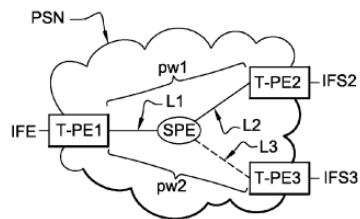


POR at 7-9, 12-13, 29-30, 41-42, 45-46; PO Surreply at 4

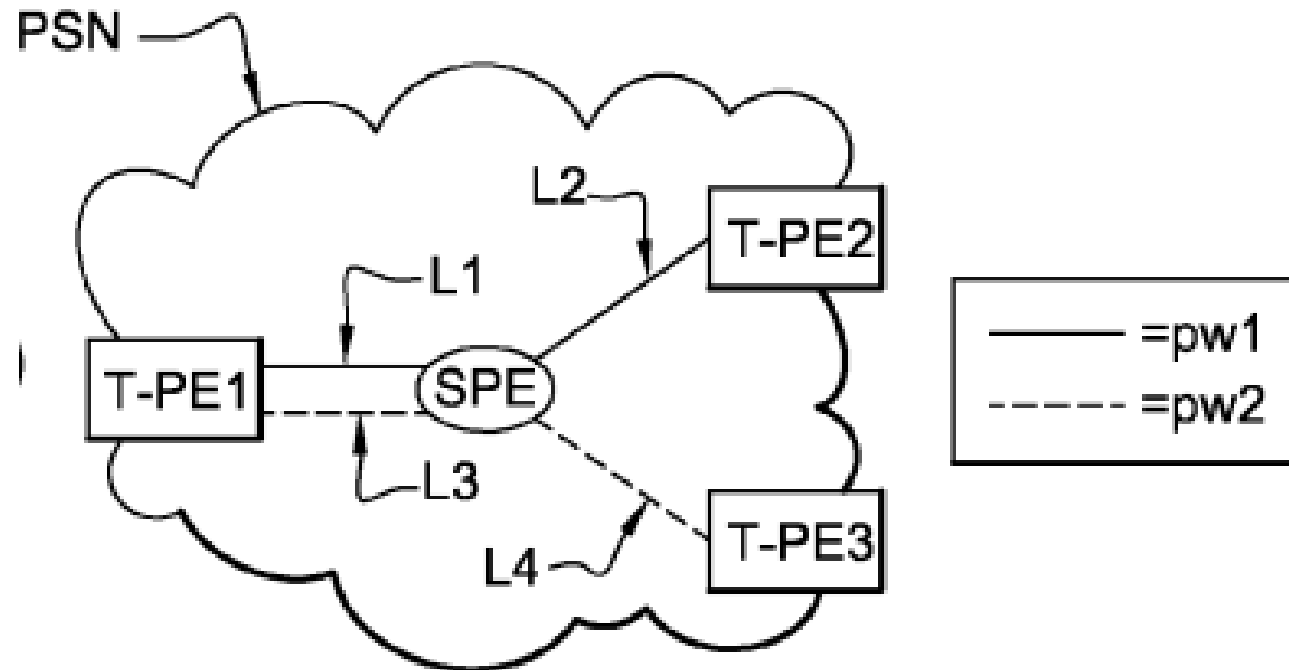
'775 Patent Invention – Problem Addressed

 US008130775B2	
(12) United States Patent Jounay et al.	(10) Patent No.: US 8,130,775 B2 (45) Date of Patent: Mar. 6, 2012
(54) MECHANISM FOR PROTECTING A PSEUDO-WIRE	(56) References Cited
(75) Inventors: Frederic Jounay , Pleumeur Bodou (FR); Philippe Niger , Lannion (FR); Arnaud Cauvin , Paris (FR)	U.S. PATENT DOCUMENTS 2007/0239891 A1 * 10/2007 Wainner et al. 709/238 2008/0089227 A1 * 4/2008 Guichard et al. 379/228 2008/0175234 A1 * 7/2008 Li 370/389 OTHER PUBLICATIONS P. Pan (Hammerhead Systems); M. Bocci, and M. Aissouli (Alcatel); F. Blass and H. Ould-Brahim (Nortel), "Pseudo Wire Protection" IETF Standard-Working-Draft, Internet Engineering Task Force, IETF, Chapter No. 3, Jul. 1, 2006. M. Bocci (Alcatel); S. Bryant (Cisco Systems), "An Architecture for Multi-Segment Pseudo Wire Emulation Edge-to-Edge" IETF Standard-Working-Draft, Internet Engineering Task Force, IETF, vol. pwe3, No. 2, Oct. 20, 2006. E. Mannie, D. Papadimitriou: "Recovery (Protection and Restoration) Terminology for Generalized Multi-Protocol Label Switching (GMPLS)" IETF Standard-Working-Draft, Internet Engineering Task Force, IETF, Oct. 5, 2004. L. Martini (Cisco Systems Inc); M. Bocci and F. Blass (Alcatel); "Dynamic Placement of Multi Segment Pseudo Wires" IETF Standard-Working-Draft, Internet Engineering Task Force, IETF, CH, vol. pwe3, No., Oct. 2, 2006. International Search Report for corresponding International Application No. PCT/FR2008/050324, filed Feb. 26, 2008. * cited by examiner Primary Examiner — Robert Wilson Assistant Examiner — Lionel Preval (74) Attorney, Agent, or Firm — David D. Brush; Westman, Champlin & Kelly, P.A. (57) ABSTRACT A method is provided for setting up at least two pseudo-wires able to broadcast a stream of data, wherein a first pseudo-wire is set up between an input router of a packet-switched network and first output router of the packet-switched network, and a second pseudo-wire is set up between the input router and a second output router of the packet-switched network. A first link of the first pseudo-wire is set up between the first output router and an intermediate router of the packet-switched network. A second link of the second pseudo-wire is set up between the second output router and the intermediate router. A third link of both pseudo-wires is set up between the intermediate router and the input router.
(73) Assignee: France Telecom , Paris (FR)	
(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 141 days.	
(21) Appl. No.: 12/528,083	
(22) PCT Filed: Feb. 26, 2008	
(86) PCT No.: PCT/FR2008/050324 § 371 (c)(1), (2), (4) Date: Nov. 25, 2009	
(87) PCT Pub. No.: WO2008/110735 PCT Pub. Date: Sep. 18, 2008	
(65) Prior Publication Data US 2010/0098094 A1 Apr. 22, 2010	
(30) Foreign Application Priority Data Feb. 26, 2007 (FR) 07 53489	
(51) Int. Cl. H04L 12/28 (2006.01)	
(52) U.S. Cl. 370/401; 710/316; 379/242	
(58) Field of Classification Search 370/401, 370/228, 389; 709/238 See application file for complete search history.	

9 Claims, 6 Drawing Sheets



Juniper Exhibit 1001, page 1



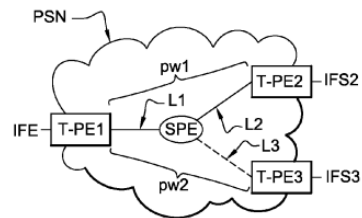
EX1001 ('775 Patent) Fig. 2

pseudo-wire, i.e. two links. The person skilled in the art has always considered a pseudo-wire as a point-to-point link set up between an input router and an output router, with the result that each input router/output router pair is associated with a pseudo-wire. Moreover, this kind of approach is rec-

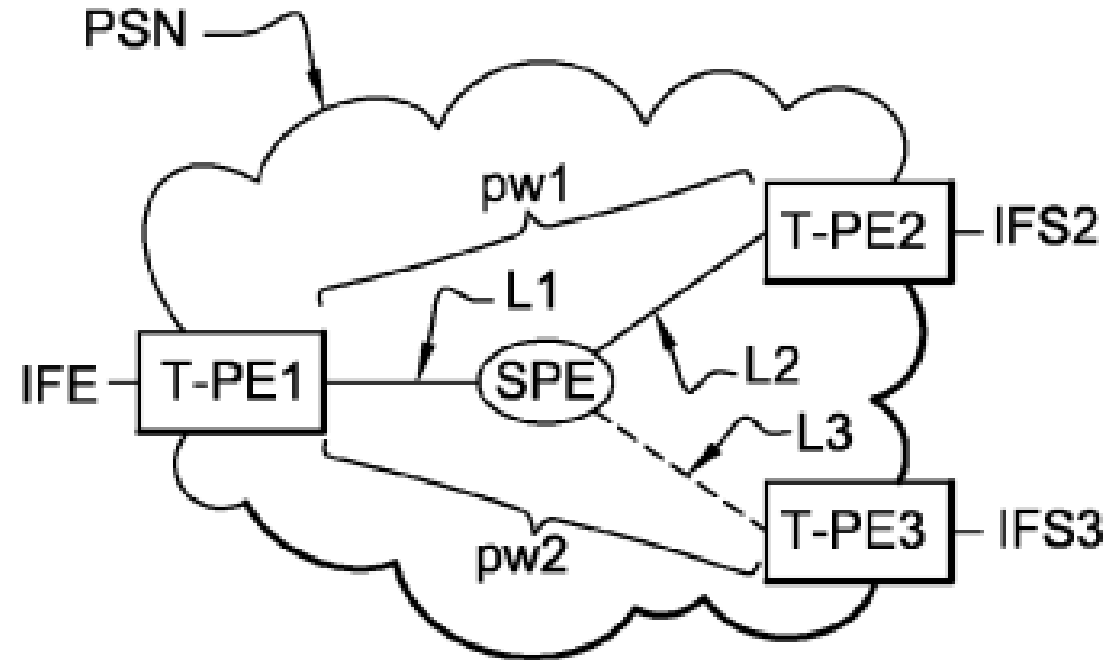
'775 Patent Invention – Solution

 US008130775B2	
(12) United States Patent Jounay et al.	(10) Patent No.: US 8,130,775 B2 (45) Date of Patent: Mar. 6, 2012
(54) MECHANISM FOR PROTECTING A PSEUDO-WIRE	(56) References Cited
(75) Inventors: Frederic Jounay , Pleumeur Bodou (FR); Philippe Niger , Lannion (FR); Arnaud Cauvin , Paris (FR)	U.S. PATENT DOCUMENTS 2007/0239891 A1 * 10/2007 Wainner et al. 709/238 2008/0089227 A1 * 4/2008 Guichard et al. 379/228 2008/0175234 A1 * 7/2008 Li 370/389 OTHER PUBLICATIONS P. Pan (Hammerhead Systems); M. Bocci, and M. Aissauoi (Alcatel); F. Blass and H. Ould-Brahim (Nortel), "Pseudo Wire Protection" IETF Standard-Working-Draft, Internet Engineering Task Force, IETF, Chapter No. 3, Jul. 1, 2006. M. Bocci (Alcatel); S. Bryant (Cisco Systems), "An Architecture for Multi-Segment Pseudo Wire Emulation Edge-to-Edge" IETF Standard-Working-Draft, Internet Engineering Task Force, IETF, vol. pwe3, No. 2, Oct. 20, 2006. E. Mannie, D. Papadimitriou: "Recovery (Protection and Restoration) Terminology for Generalized Multi-Protocol Label Switching (GMPLS)" IETF Standard-Working-Draft, Internet Engineering Task Force, IETF, Oct. 5, 2004. L. Martini (Cisco Systems Inc); M. Bocci and F. Blass (Alcatel); "Dynamic Placement of Multi Segment Pseudo Wires" IETF Standard-Working-Draft, Internet Engineering Task Force, IETF, CH, vol. pwe3, No. 2, Oct. 2, 2006. International Search Report for corresponding International Application No. PCT/FR2008/050324, filed Feb. 26, 2008.
(73) Assignee: France Telecom , Paris (FR)	
(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 141 days.	
(21) Appl. No.: 12/528,083	
(22) PCT Filed: Feb. 26, 2008	
(86) PCT No.: PCT/FR2008/050324 § 371 (c)(1), (2), (4) Date: Nov. 25, 2009	
(87) PCT Pub. No.: WO2008/110735 PCT Pub. Date: Sep. 18, 2008	
(65) Prior Publication Data US 2010/0098094 A1 Apr. 22, 2010	
(30) Foreign Application Priority Data Feb. 26, 2007 (FR) 07 53489	
(51) Int. Cl. H04L 12/28 (2006.01)	
(52) U.S. CL. 370/401; 710/316; 379/242	
(58) Field of Classification Search 370/401, 370/228, 389; 709/238 See application file for complete search history.	

9 Claims, 6 Drawing Sheets



Juniper Exhibit 1001, page 1



EX1001 ('775 Patent) Fig. 3

Going against this received wisdom of the person skilled in the art, the inventors of the present application propose, in contrast, to share the link set up between the input router and the intermediate router, which improves the use of network resources and reduces the restore time in the event of a fault affecting the first output router. In the prior art, the back-up

'775 Patent Invention – Claims



US008130775B2

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

(10) **Patent No.:** US 8,130,775 B2
(45) **Date of Patent:** Mar. 6, 2012

(54) **MECHANISM FOR PROTECTING A PSEUDO-WIRE**

(75) Inventors: **Frederic Jounay**, Pleumeur Bodou (FR); **Philippe Nigier**, Lannion (FR); **Arnaud Cauvin**, Paris (FR)

(73) Assignee: **France Telecom**, Paris (FR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 141 days.

(21) Appl. No.: **12/528,083**

(22) PCT Filed: **Feb. 26, 2008**

(86) PCT No.: **PCT/FR2008/050324**

§ 371 (c)(1),

(2), (4) Date: **Nov. 25, 2009**

(87) PCT Pub. No.: **WO2008/110735**

PCT Pub. Date: **Sep. 18, 2008**

(65) **Prior Publication Data**

US 2010/0098094 A1 Apr. 22, 2010

(30) **Foreign Application Priority Data**

Feb. 26, 2007 (FR) 07 53489

(51) Int. Cl. **H04L 12/28** (2006.01)

(52) U.S. Cl. **370/401; 710/316; 379/242**

(58) **Field of Classification Search** **370/401;**

370/228, 389; 709/238

See application file for complete search history.

(56) **References Cited**

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2008/0089227 A1* 4/2008 Guichard et al. 370/228
2008/0175234 A1* 7/2008 Li 370/389

OTHER PUBLICATIONS

P. Pan (Hammerhead Systems); M. Bocci, and M. Aissaoui (Alcatel); F. Blass and H. Ould-Brahim (Nortel), "Pseudo Wire Protection" IETF Standard-Working-Draft, Internet Engineering Task Force, IETF, Chapter No. 3, Jul. 1, 2006.
M. Bocci (Alcatel); S. Bryant (Cisco Systems), "An Architecture for Multi-Segment Pseudo Wire Emulation Edge-to-Edge" IETF Standard-Working-Draft, Internet Engineering Task Force, IETF, vol. pwe3, No. 2, Oct. 20, 2006.
E. Mannie, D. Papadimitriou, "Recovery (Protection and Restoration) Terminology for Generalized Multi-Protocol Label Switching (GMPLS)" IETF Standard-Working-Draft, Internet Engineering Task Force, IETF, Oct. 5, 2004. L. Martini (Cisco Systems Inc); M. Bocci and F. Balus (Alcatel), "Dynamic Placement of Multi Segment Pseudo Wires" IETF Standard-Working-Draft, Internet Engineering Task Force, IETF, CH, vol. pwe3, No. 2, Oct. 2, 2006.
International Search Report for corresponding International Application No. PCT/FR2008/050324, filed Feb. 26, 2008.

* cited by examiner

Primary Examiner — Robert Wilson

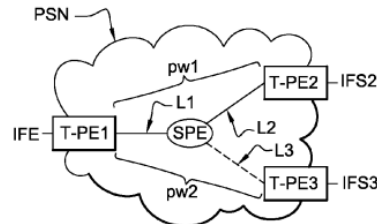
Assistant Examiner — Lionel Preval

(74) Attorney, Agent, or Firm — David D. Brush; Westman, Champlin & Kelly, P.A.

(57) **ABSTRACT**

A method is provided for setting up at least two pseudo-wires able to broadcast a stream of data, wherein a first pseudo-wire is set up between an input router of a packet-switched network and first output router of the packet-switched network, and a second pseudo-wire is set up between the input router and a second output router of the packet-switched network. A first link of the first pseudo-wire is set up between the first output router and an intermediate router of the packet-switched network. A second link of the second pseudo-wire is set up between the second output router and the intermediate router. A third link of both pseudo-wires is set up between the intermediate router and the input router.

9 Claims, 6 Drawing Sheets



Juniper Exhibit 1001, page 1

1. A method of setting up at least two pseudo-wires able to broadcast a data stream, comprising:

setting up a first pseudo-wire comprising a first link set up between an input router of a packet-switched network and an intermediate router of the packet-switched network and a second link set up between said intermediate router and a first output router of the packet-switched network; and

setting up a second pseudo-wire between said input router and a second output router of the packet-switched network, wherein the second pseudo-wire comprises said first link and a third link set up between said intermediate router and said second output router, said first link being shared by the first and second pseudo-wires.

EX1001 ('775 Patent) Claim 1; see also Claim 6

'775 Patent Invention – “Link”

Term	Construction
“link”	“connection between an interface of a first router and an interface of a second router”

Pet. at 19.

1. A method of setting up at least two pseudo-wires able to broadcast a data stream, comprising:

setting up a first pseudo-wire comprising a **first link** set up between an input router of a packet-switched network and an intermediate router of the packet-switched network and a **second link** set up between said intermediate router and a first output router of the packet-switched network; and

setting up a second pseudo-wire between said input router and a second output router of the packet-switched network, wherein the second pseudo-wire comprises said **first link** and a **third link** set up between said intermediate router and said second output router, said **first link** being shared by the first and second pseudo-wires.

POR at 18-37, PO Surreply at 1-13

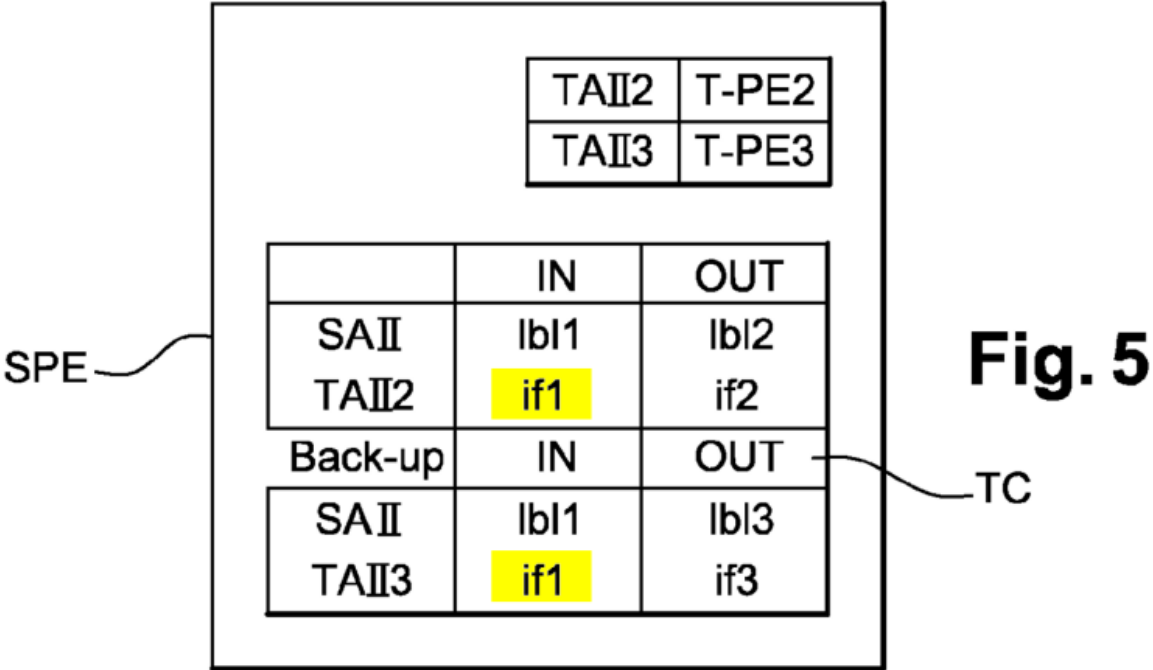
Background – “Interface”

Term	Construction
“link”	“connection between an interface of a first router and an interface of a second router”

Pet. at 19.

74. In order for PW1 and PW2 to share the same link they must necessarily both connect to the same interface on the intermediate router. This is confirmed by the '775 Patent's Figure 5, which shows “routing and switching tables of an intermediate router.” EX1001 5:53-55.

EX2006 ¶74



'775 Patent Invention – “Interface”

Term	Construction
“link”	“connection between an interface of a first router and an interface of a second router”

Pet. at 19.

EX1033 ¶133

133. The Cisco Configuration Guide shows the configuration of the underlying P2MP sub-LSP and pseudo-wires (Bridge Domain – L2VPN) confirming the link between the input router and Intermediate router is used for both the pseudo-wires terminating at the PE2 and PE3 and traversing the intermediate, a.k.a. bud, router. The Loopback addresses are (identifying only the last octate):

PE1:- .225

P:-.226

PE2:-.227

PE3:-.228

```
RP/0/RSP0/CPU0:PE1#show l2vpn bridge-domain
```

```
List of VFI's:
```

```
VFI bg1_bdi_vfi (up)
```

```
P2MP: RSVP-TE, BGP, 1, Tunnel Up
```

```
Neighbor 209.165.200.226 pw-id 1, state: up, Static MAC address
```

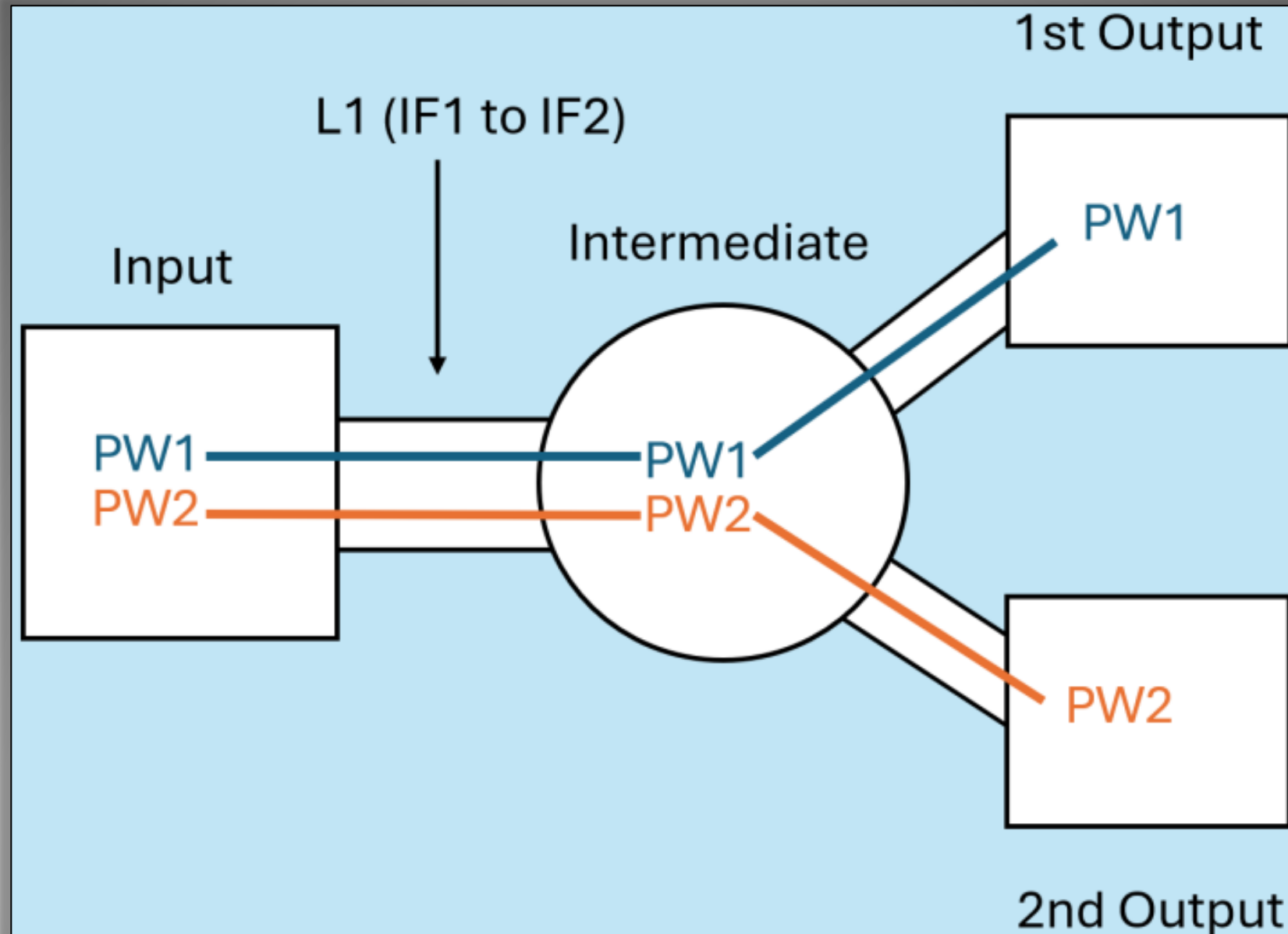
```
Neighbor 209.165.200.227 pw-id 1, state: up, Static MAC address
```

```
Neighbor 209.165.200.228 pw-id 1, state: up, Static MAC address
```

```
RP/0/RSP0/CPU0:PE1#
```

PO Surreply at 7-13

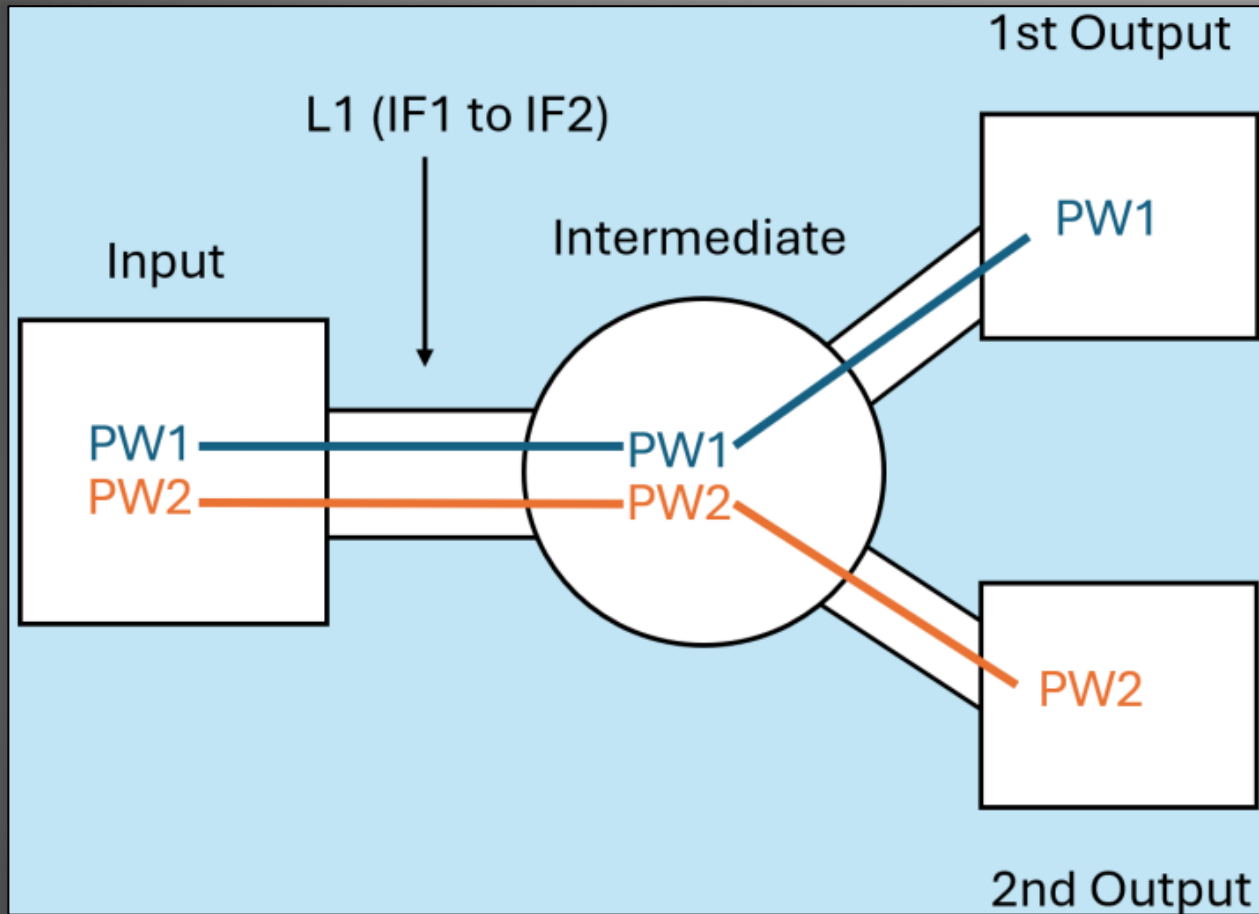
'775 Patent Approach – One Link, Two PWs



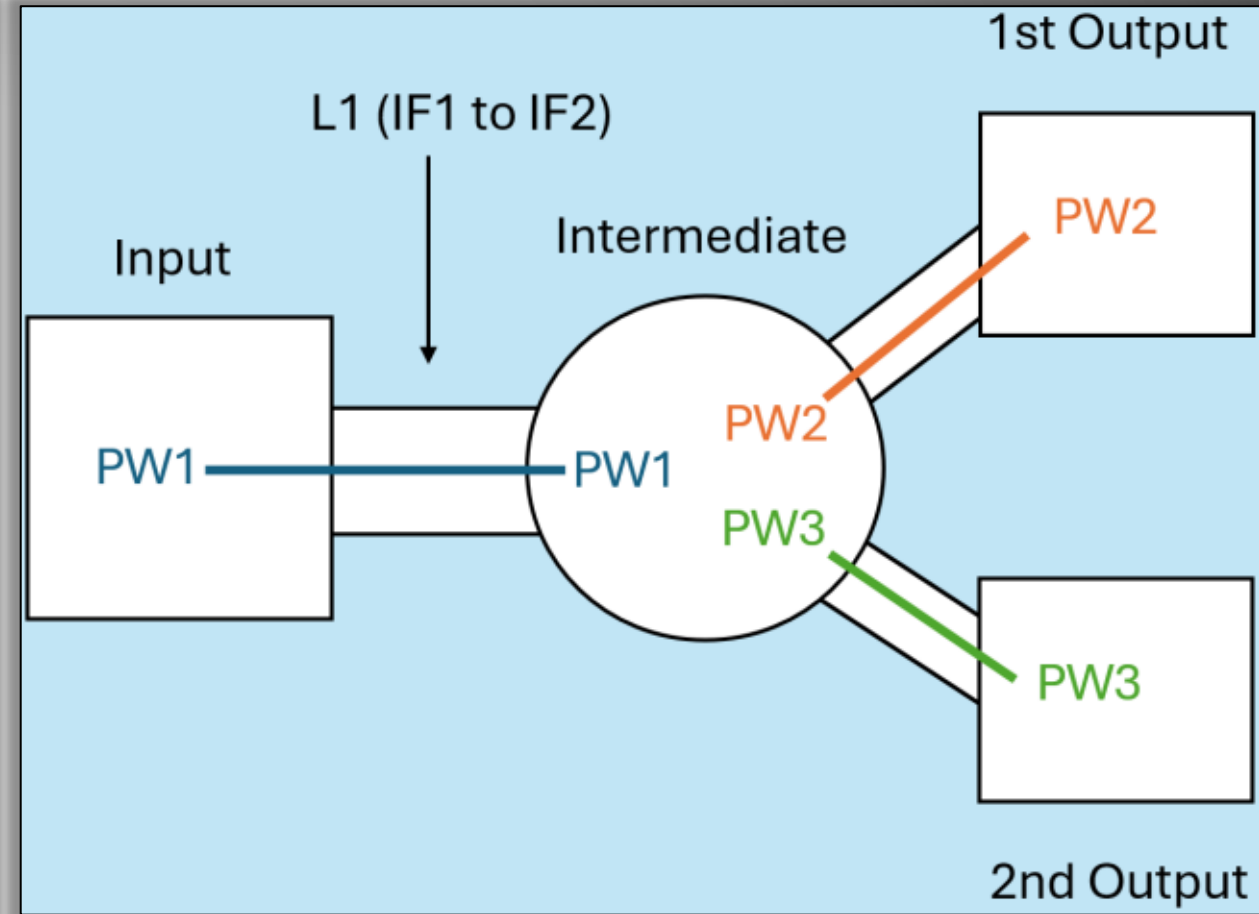
POR at 22, 33-37

'775 Patent vs. One Link, One PW

'775 Patent Approach

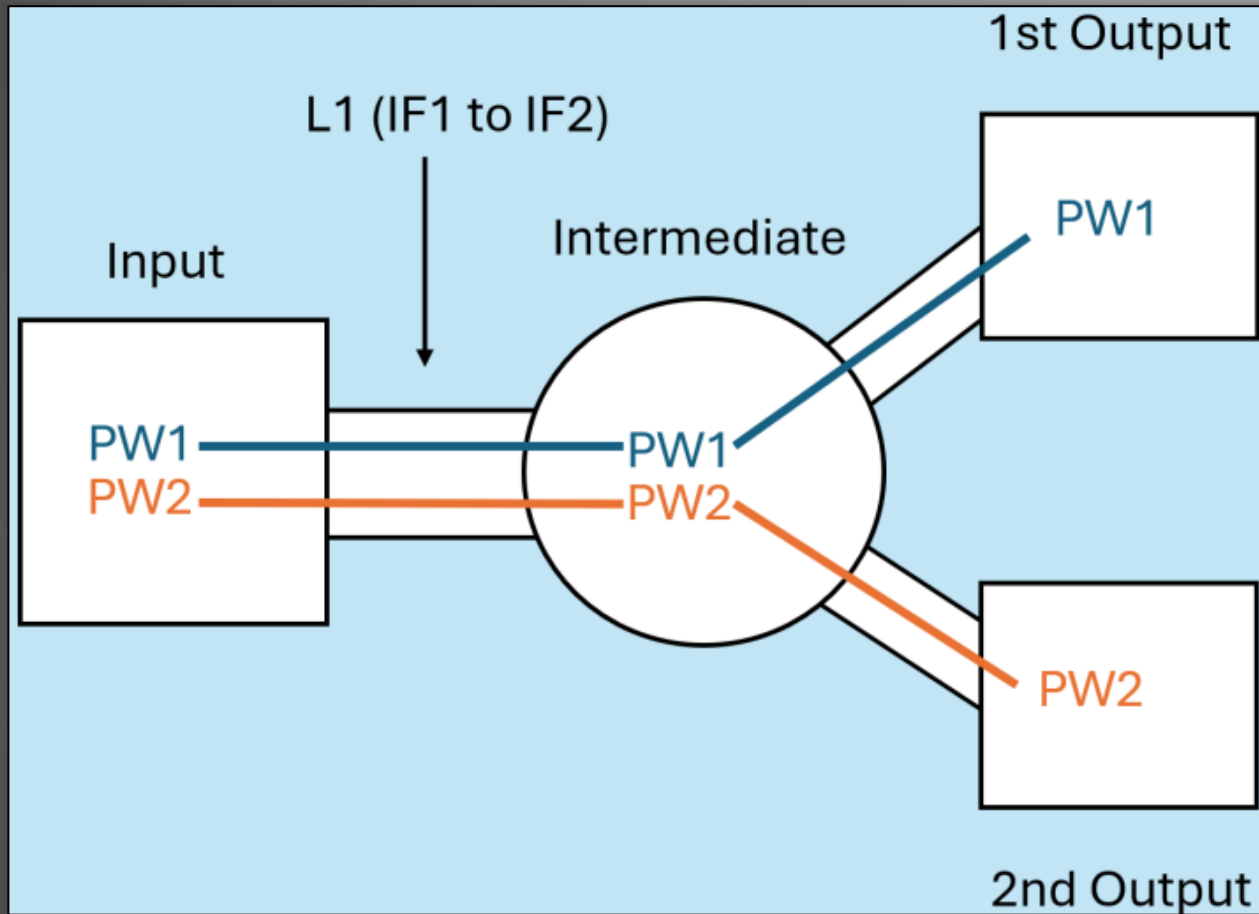


Prior Art Approach

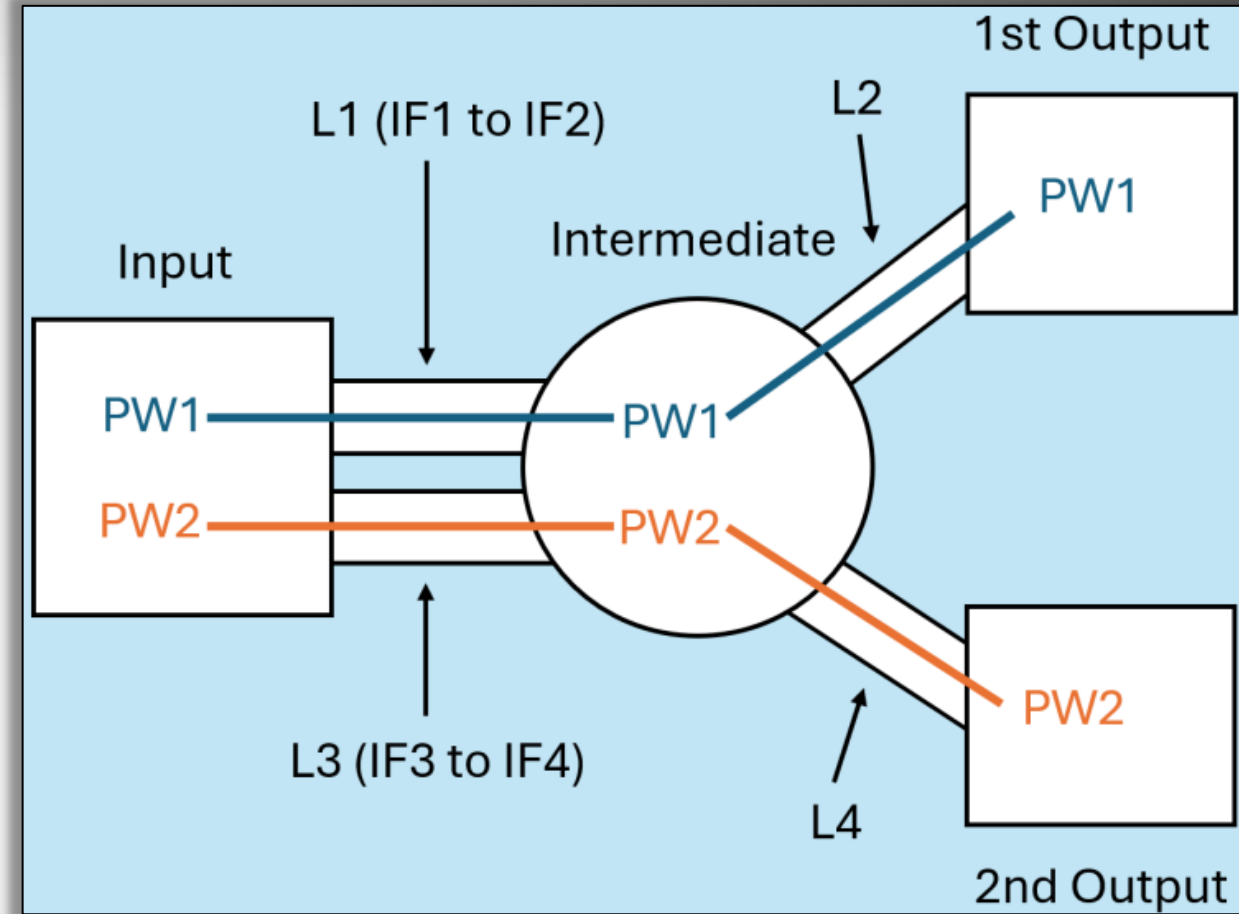


'775 Patent vs. Two Links, Two PWs

'775 Patent Approach



Prior Art Approach



Outline

- '775 Patent Overview and Background
- **Ground 1 - Wainner and Bocci**
- **Ground 2 - Kamite and Bocci**

Ground 1: Wainner and Bocci

Wainner+Bocci: One Link, One PW

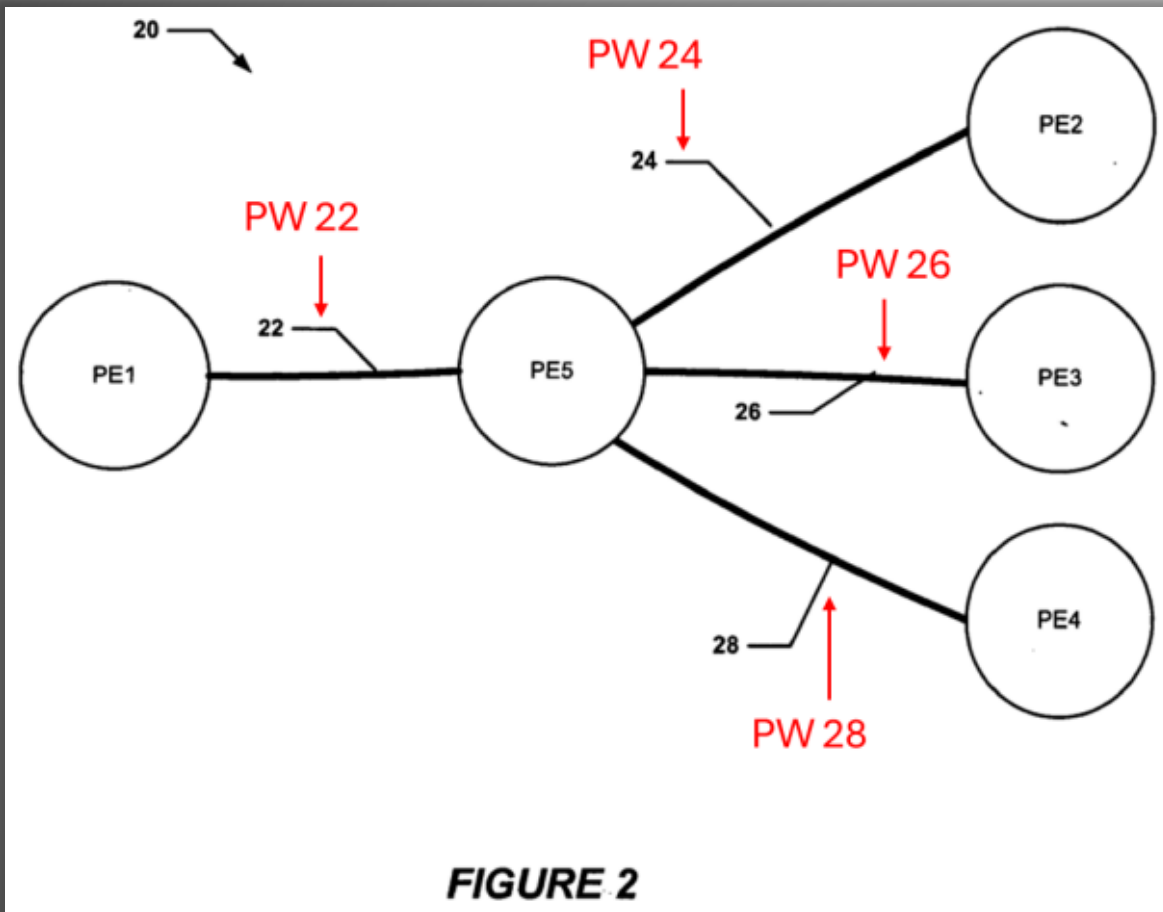
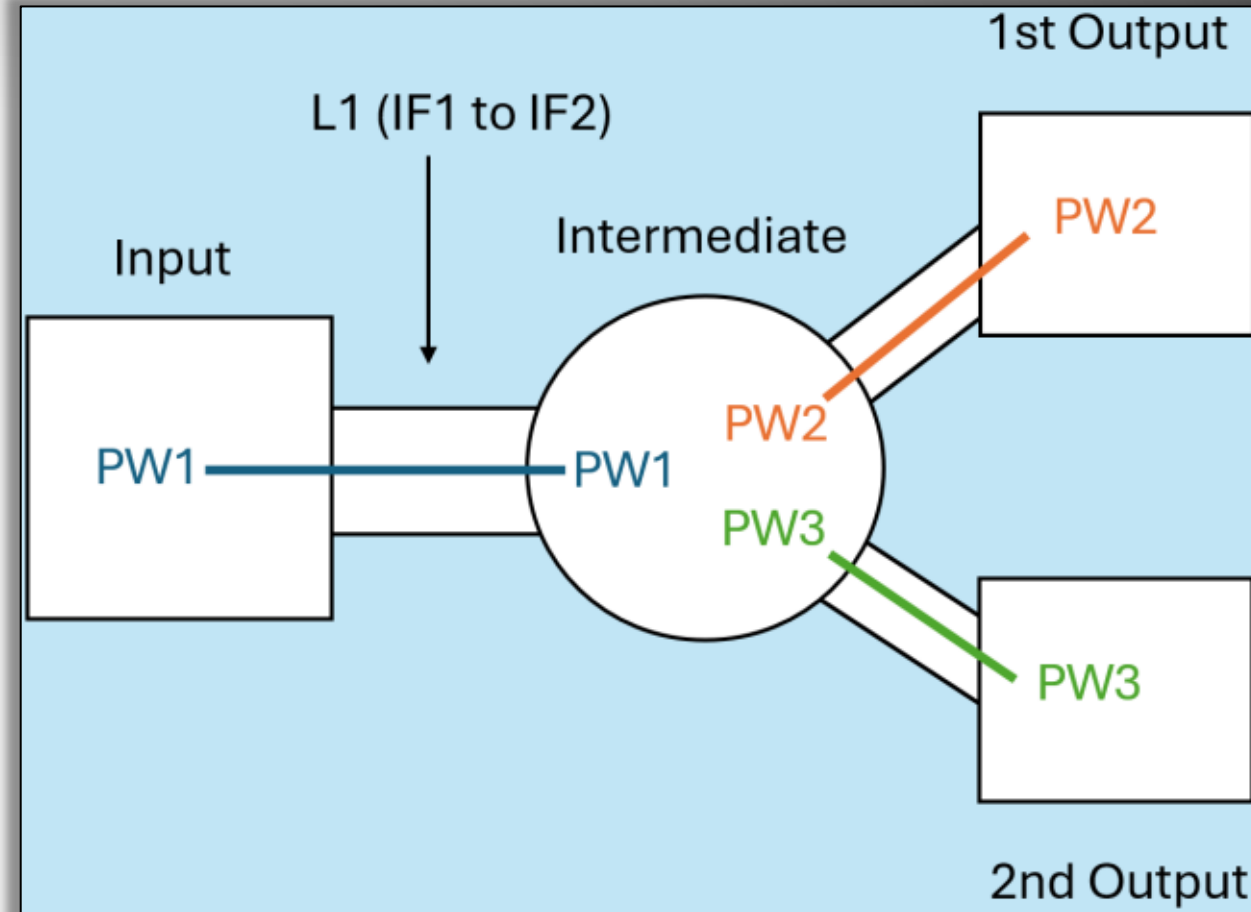


FIGURE 2

POR at 39



POR at 26

Ground 1: Wainner and Bocci

Wainner+Bocci: One Link, One PW

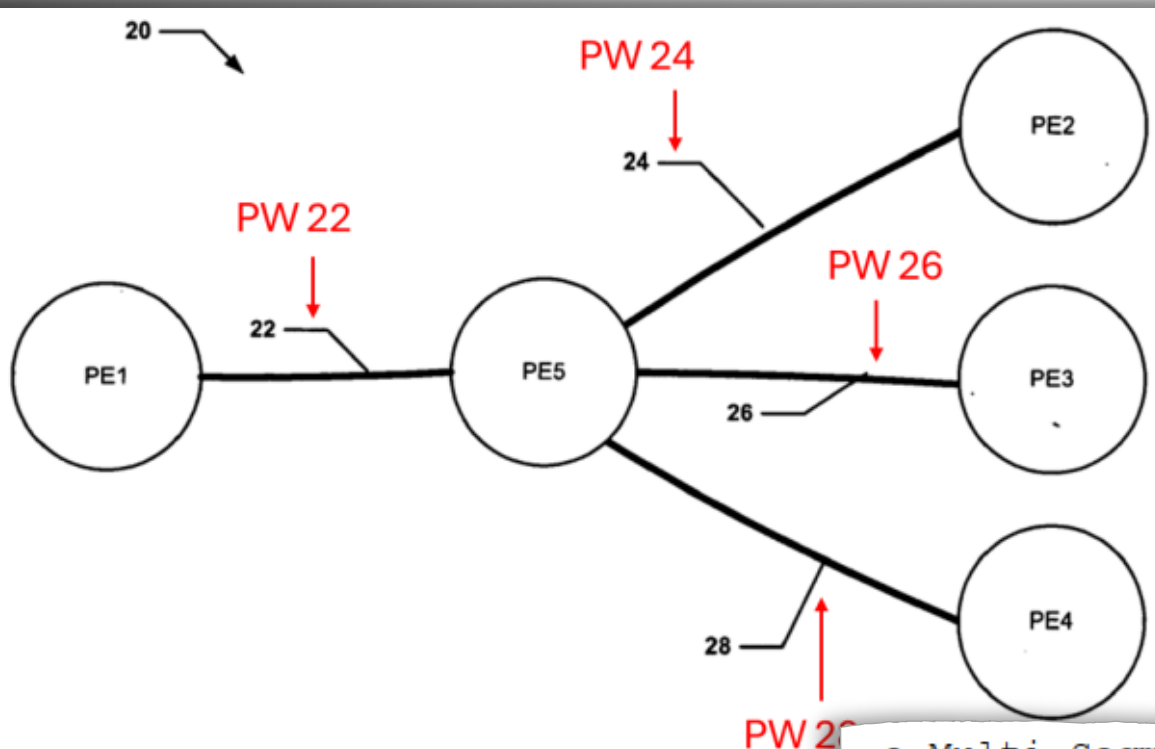


FIGURE 2

[0023] The present invention described in FIG. 2 introduces the concept of head-end and tail-end of a PW that correlate with upstream and downstream, respectively. A PW 22 is signaled between an origination PE (O-PE) (PE1) and an S-PE (PE5) where the content is sourced at the O-PE.

EX1030 (Wainner) [0023]

- o Multi-Segment Pseudo Wire (MS-PW). A static or dynamically configured set of two or more contiguous PW segments that behave and function as a single point-to-point PW. Each end of a MS-PW by definition MUST terminate on a T-PE.
- o PW Segment. A part of a single-segment or multi-segment PW, which is set up between two PE devices, T-PEs and/or S-PEs.

POR at 39

POR at 39-42; PO Surreply at 13-17

EX1031 (Bocci) at 6

Ground 1: Wainner and Bocci

Wainner+Bocci: One Link, One PW

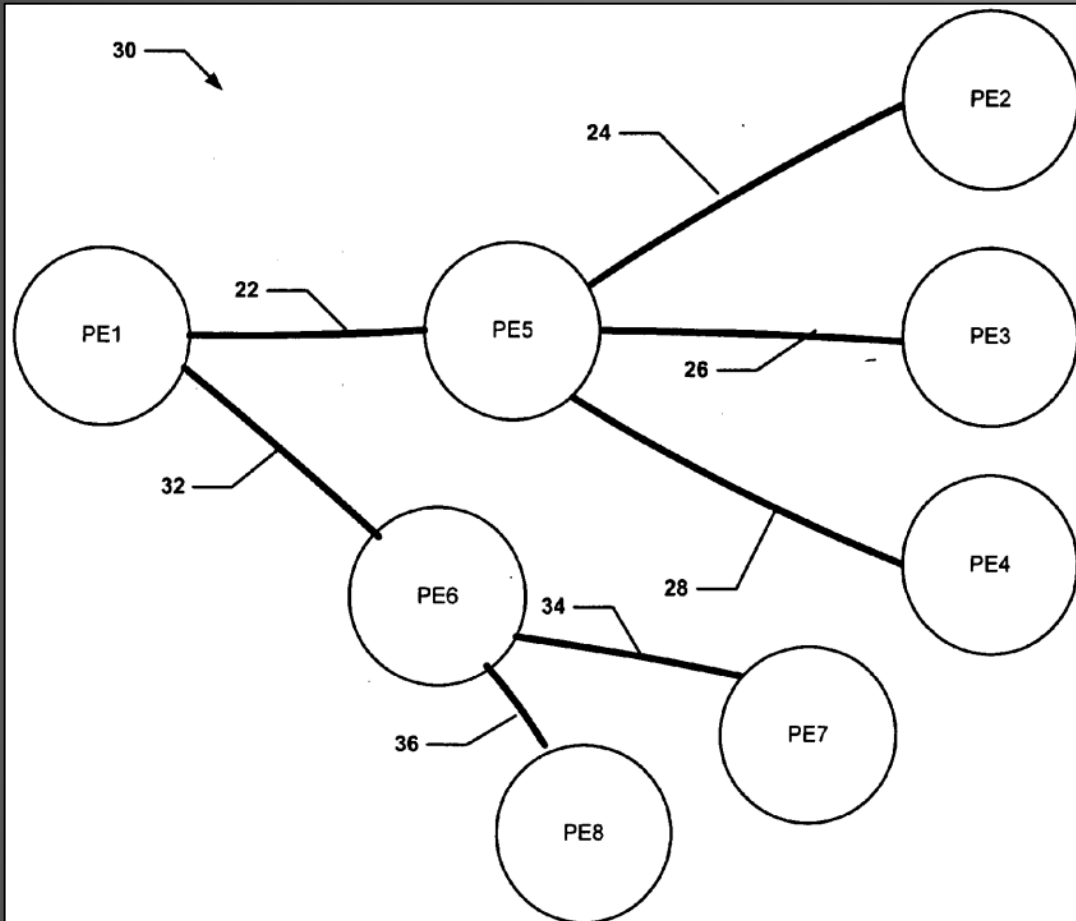


FIGURE 3

[0025] Referring now to FIG. 3, a similar environment 30 as environment 20 of FIG. 2 is shown. Environment 30 includes a PW 22 between a first origination PE (O-PE) (PE1) and an S-PE (PE5) where the content is sourced at the O-PE. The S-PE understands through the PW control plane that it is receiving the tail-end of the PW. Subsequently, the S-PE signals the establishment of PWs to one or more downstream receiving PE (R-PE). In this instance PW 24 is established between PE5 and PE2, PW 26 is established between PE5 and PE3 and PW 28 is established between PE5 and PE4. The R-PE (e.g., PE 2, PE3 and/or PE4) recognizes via the control plane that it is also terminating a tail-end of the PW (e.g., PW 22, 24 and/or 26). Also shown is a second S-PE, PE6. PE6 is also in communication with

EX1030 (Wainner) [0025]

Outline

- '775 Patent Overview and Background
- Ground 1 - Wainner and Bocci
- Ground 2 - Kamite and Bocci

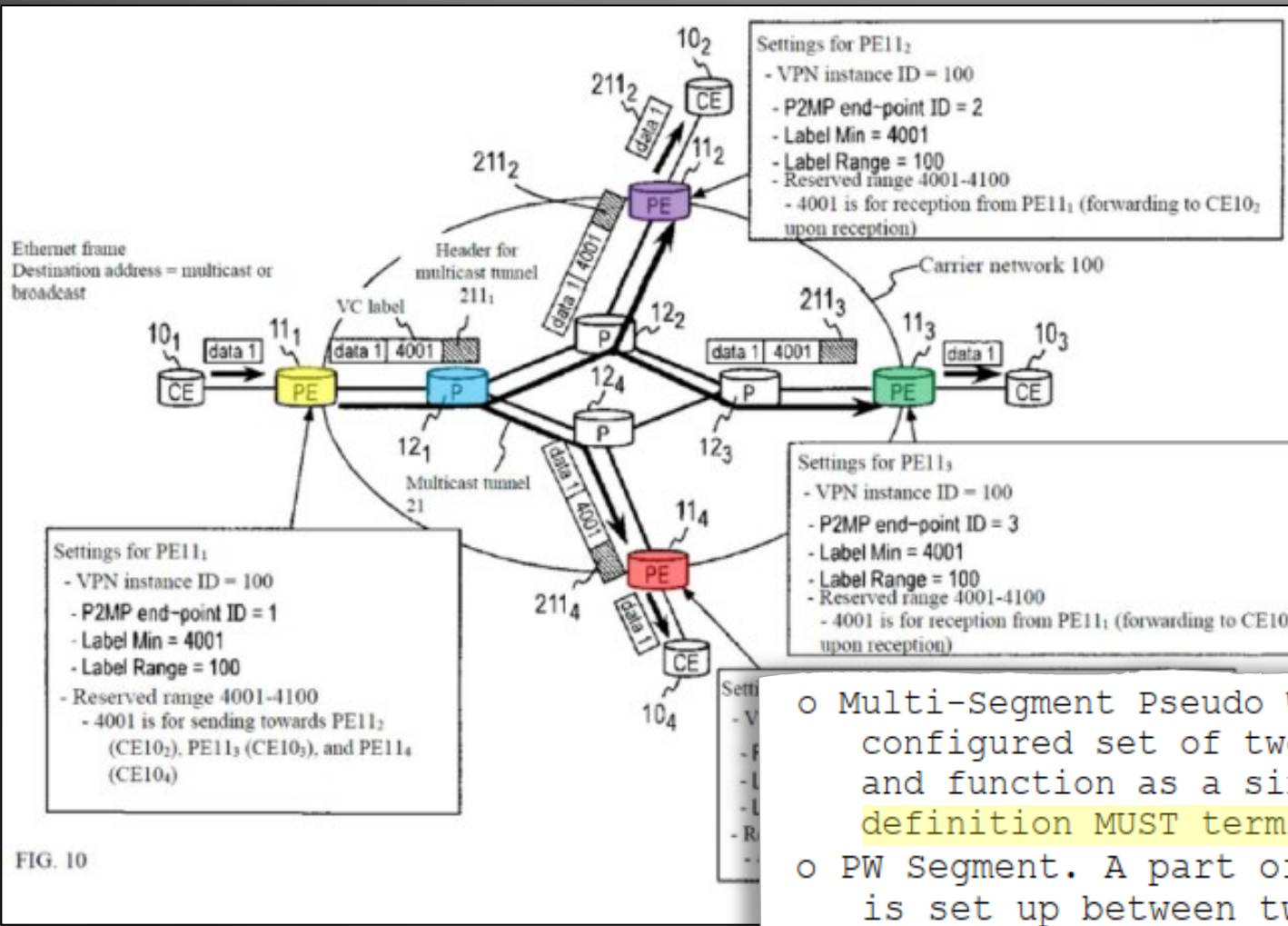
Ground 2: Kamite and Bocci

Kamite+Bocci – Petitioner's Theories:

- **Kamite Figure 10 (one link, one pseudowire)**
- **Kamite Figure 3 (three links, three pseudowires)**

Ground 2: Kamite and Bocci

Kamite+Bocci: Figure 10

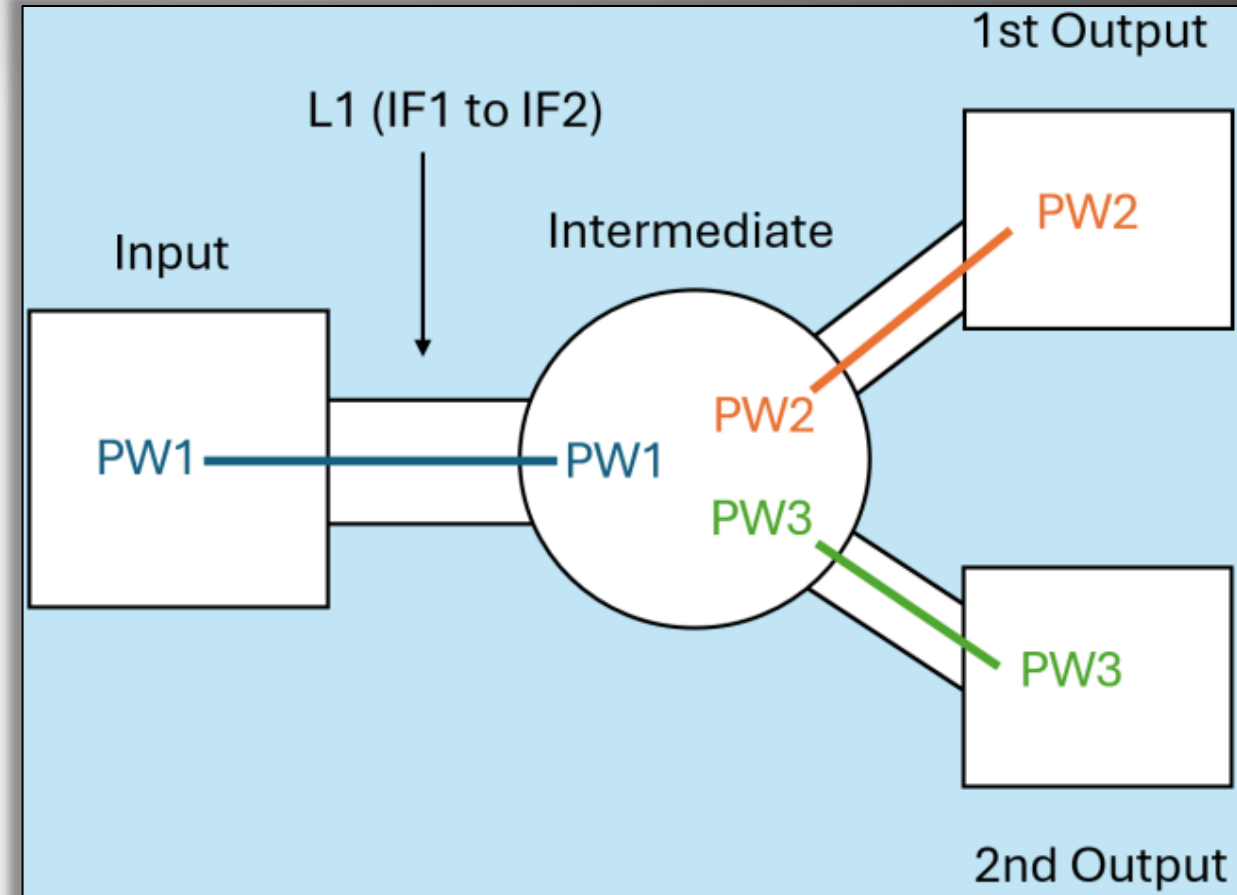
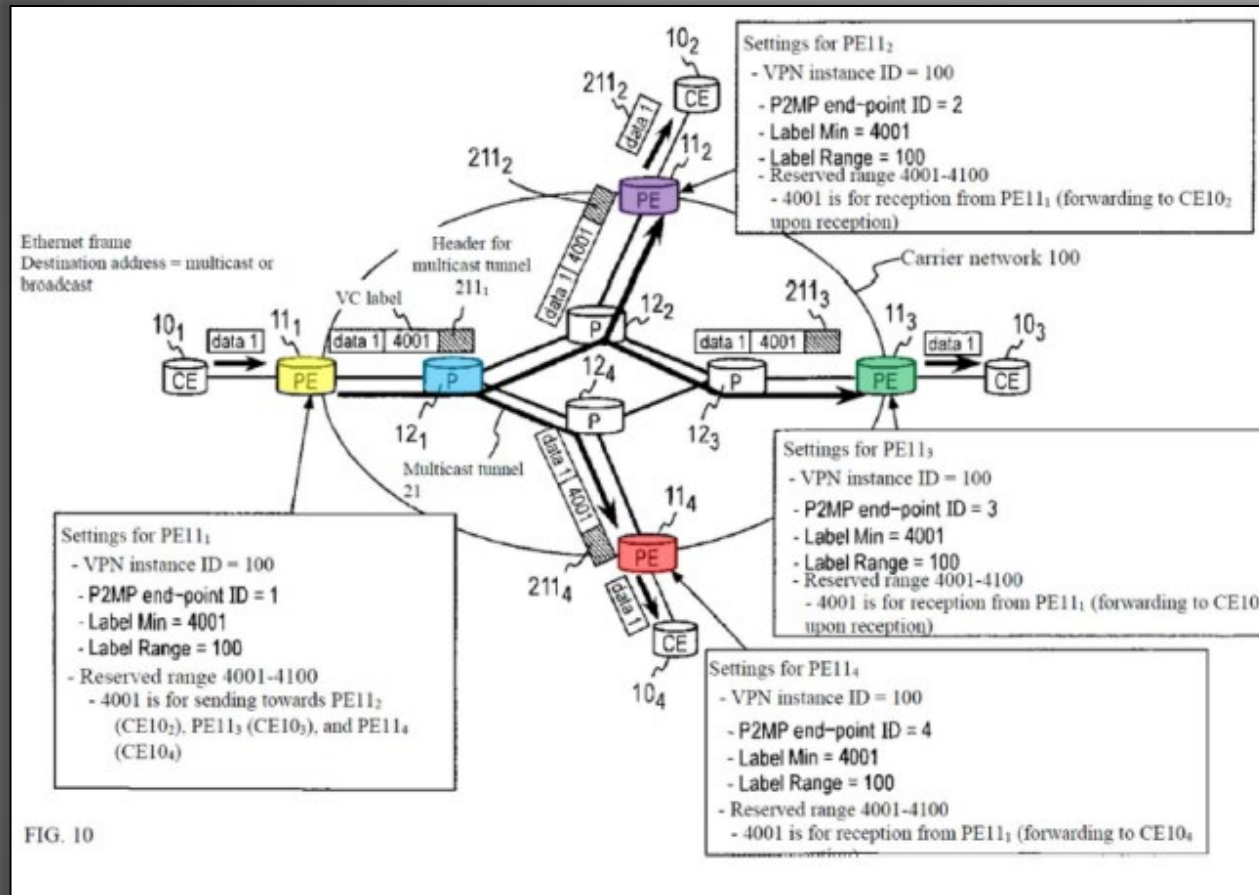


POR at 25-33, 43-46;
PO Surreply at 17-21

- o Multi-Segment Pseudo Wire (MS-PW). A static or dynamically configured set of two or more contiguous PW segments that behave and function as a single point-to-point PW. Each end of a MS-PW by definition MUST terminate on a T-PE.
- o PW Segment. A part of a single-segment or multi-segment PW, which is set up between two PE devices, T-PEs and/or S-PEs.

Ground 2: Kamite and Bocci

Kamite+Bocci: Figure 10



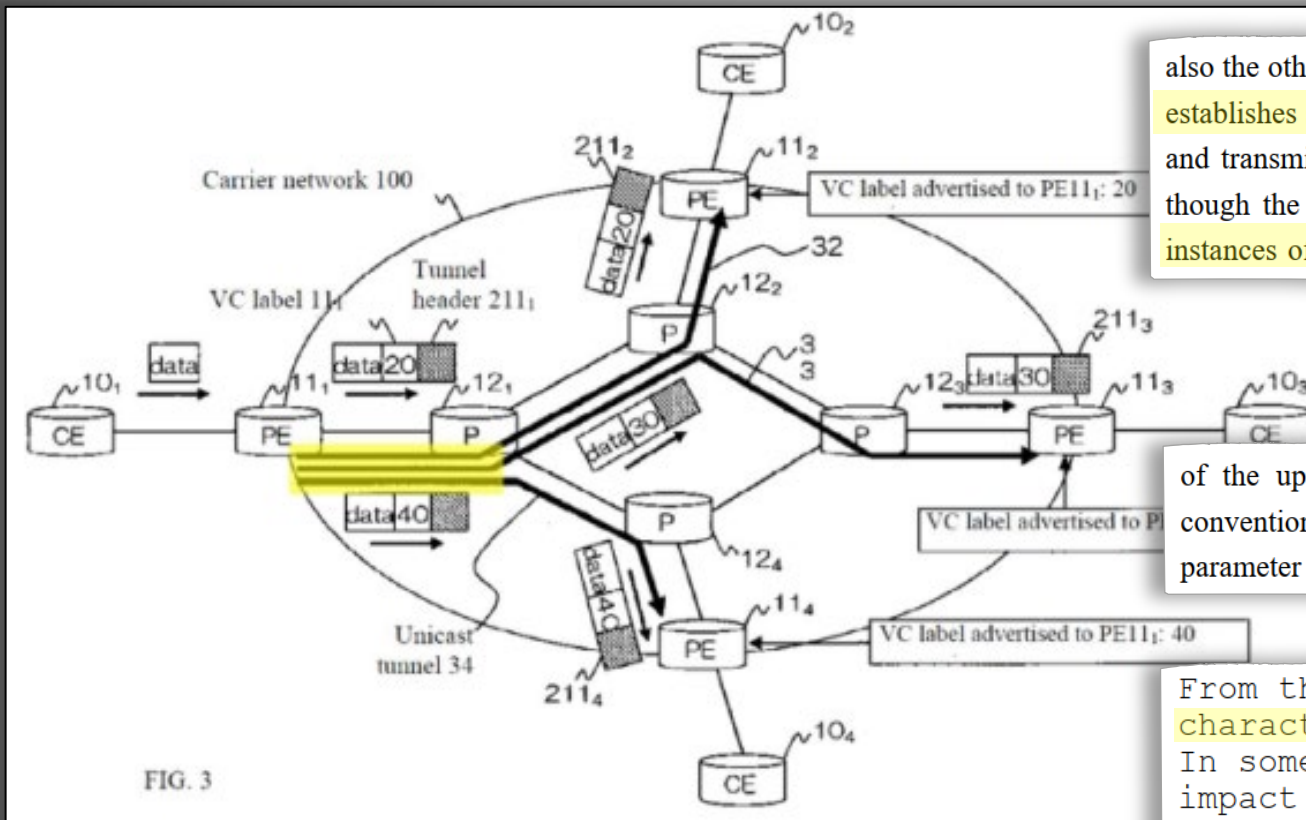
POR at 26

POR at 44

POR at 25-33, 43-46; PO Surreply at 17-21

Ground 2: Kamite and Bocci

Kamite+Bocci: Figure 3



also the other PEs (PE113 and PE114), rendering communication impossible. Thus, as shown in FIG. 3, PE111 establishes separate unicast tunnels with PE112, PE113, and PE114, copies the data that was sent from CE101, and transmits that data after assigning the advertised VC label for each downstream PE. In this way, even though the actual data to be transmitted (the data that was sent from CE101) is the same, there are three instances of traffic between PE111 and P121. In other words, if a multicast tunnel could be utilized using a

EX1041 (Kamite) [0007]

of the upstream PE is used for the P2MP Source endpoint ID. "Interface Parameter" is used in the conventional point-to-point pseudo wire specification (Non-Patent Document 1). In the present invention, this parameter is used as-is.

EX1041 (Kamite) [0014]

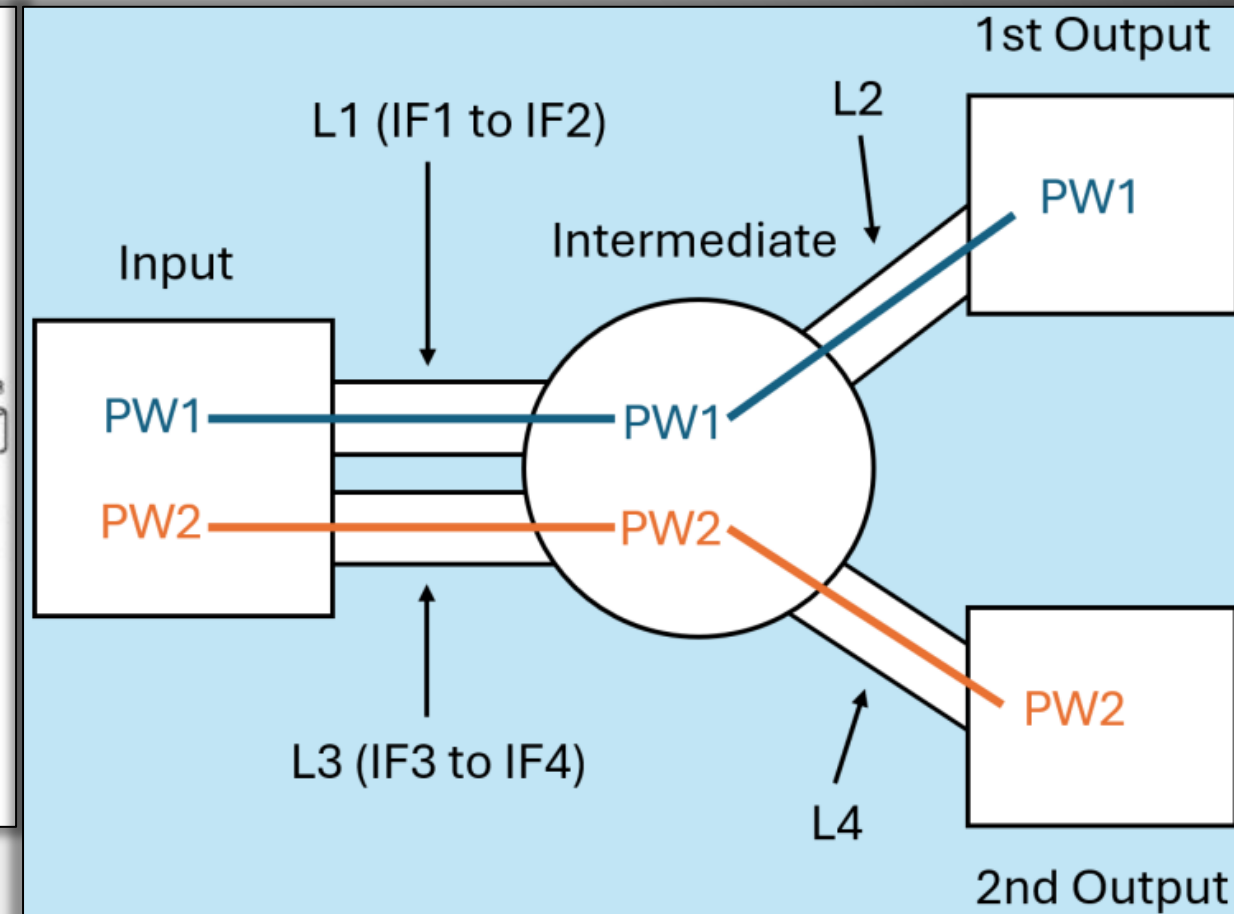
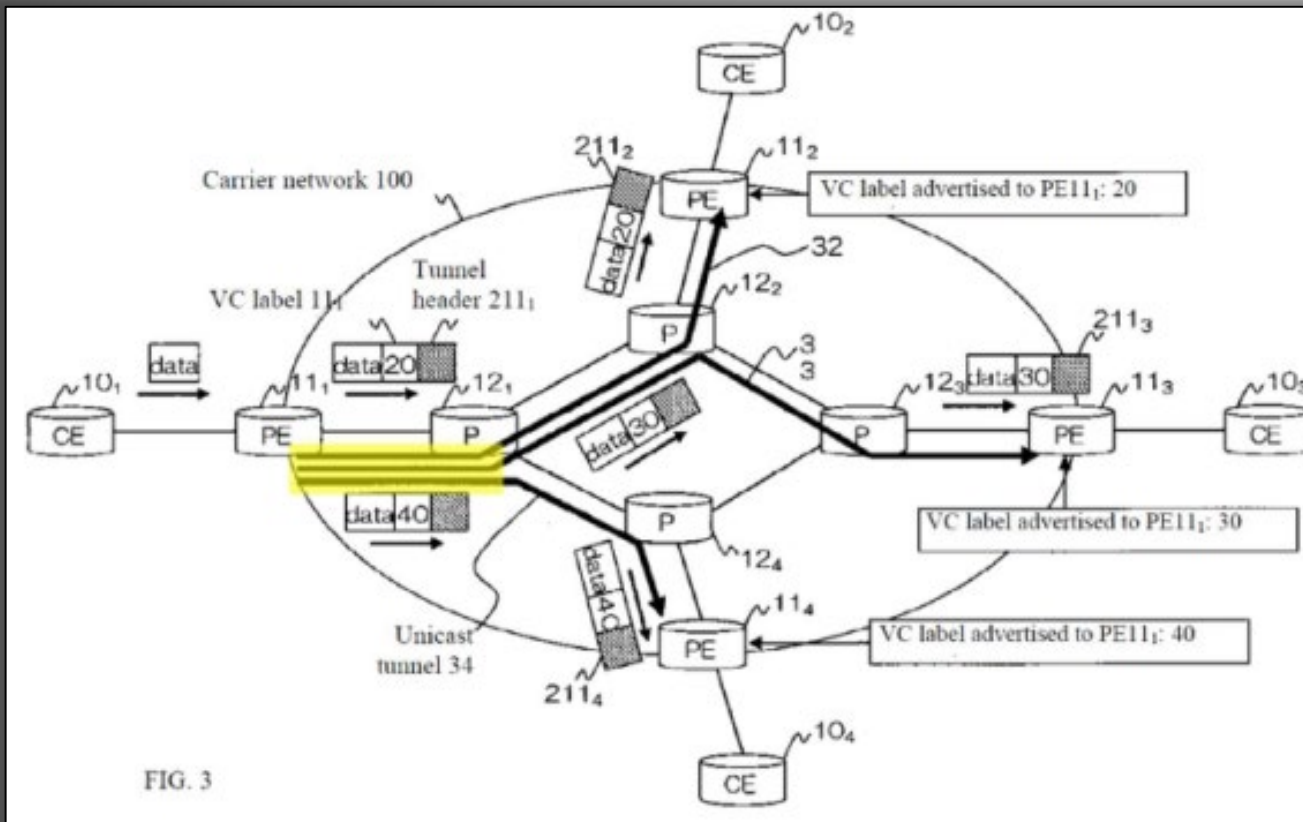
From the perspective of Customer Edge Equipment (CE), the PW is characterized as an unshared link or circuit of the chosen service. In some cases, there may be deficiencies in the PW emulation that impact the traffic carried over a PW and therefore limit the applicability of this technology. These limitations must be fully described in the appropriate service-specific documentation.

EX1010 (RFC 3985) at 3

POR at 46-47

Ground 2: Kamite and Bocci

Kamite+Bocci: Figure 3



POR at 46-47

Ground 2: Kamite and Bocci

Kamite+Bocci: Figure 3

Resp. 18. Thus, although Patent Owner contends that Kamite “does not teach that pseudo[-]wires can share the same interfaces” (Prelim. Resp. 35), we instead find availing Petitioner’s contention that Kamite’s multi-segment pseudo-wires share the link between input router PE11₁ and intermediate router P12₁. Pet. 69, 71, 74–76, 78 (citing Ex. 1041, Fig. 10; Ex. 1040 ¶¶ 126, 129, 136, 139–140).

Institution Decision at 44-45

the prior art. In the prior art, when a main pseudo-wire and a back-up pseudo-wire are set up between an input router and a first, respectively a second, output router, a link is set up between the input router and the intermediate router for each pseudo-wire, i.e. two links. The person skilled in the art has always considered a pseudo-wire as a point-to-point link set up between an input router and an output router, with the result that each input router/output router pair is associated with a pseudo-wire. Moreover, this kind of approach is recommended in the standards.

Going against this received wisdom of the person skilled in the art, the inventors of the present application propose, in contrast, to share the link set up between the input router and the intermediate router, which improves the use of network resources and reduces the restore time in the event of a fault affecting the first output router. In the prior art, the back-up pseudo-wire, although used only to broadcast data in the event of a fault affecting the main pseudo-wire, reserves resources used to set it up over the whole of the network between the input router and the output router. Because the