

IPR2023-00714

U.S. Patent No. 6,680,904

CISCO SYSTEMS, INC. v. ORCKIT CORP.

Petitioner's Demonstrative Exhibits



July 9, 2024

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

IPR2023-00714
Cisco Systems, Inc. v. Orckit IP, LLC.
Cisco's Exhibit 1018
Exhibit 1018, Page 1

Roadmap

- 1 Overview of the '904 Patent
- 2 Grounds
- 3 Disputed Issues

Network Access System With Masters And Slaves

(12) United States Patent Kaplan et al.

(10) Patent No.: US 6,680,904 B1
(45) Date of Patent: Jan. 20, 2004

(54) BI-DIRECTIONAL CHAINING OF NETWORK ACCESS PORTS

(75) Inventors: Menachem Kaplan, Petach Tikva (IL);
David Zelig, Givatim (IL); Roy
Kinamon, Tel Aviv (IL); Eli Aloni,
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(73) Assignee: Orckit Communications Ltd., Tel Aviv
(IL)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

(21) Appl. No.: 09/472,683

(22) Filed: Dec. 27, 1999

(51) Int. Cl.⁷ G01R 31/08; H04L 12/66;
H04L 12/28; H04L 3/16

(52) U.S. Cl. 370/217; 370/352; 370/392;
370/395.1; 370/465

(58) Field of Search 370/216, 217,
370/352-356, 389, 392, 395.1, 465, 466;
340/2.28, 2.24; 710/110, 129, 131, 132;
712/31, 39; 709/208, 209, 225, 229; 375/222

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6,215,863 B1 * 4/2001 Bennett, III et al. 379/221.09
6,219,354 B1 * 4/2001 Fink et al. 370/463
6,317,415 B1 * 11/2001 Danell et al. 370/230
6,345,051 B1 * 2/2002 Gupta et al. 370/395.2
6,404,861 B1 * 6/2002 Cohen et al. 379/93.01
6,424,657 B1 * 7/2002 Voit et al. 370/412

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Dave Allen et al., "An "Optimized for ATM" ADSL Access
Architecture using SDP", 7 pages, ADSL Forum 98-221,
Nov. 17th to 20th, 1998, Los Angeles, CA, USA.
"Vortex Chip Set: Introduction", Preliminary Issue 1, 16
pages, Jun. 1999, PMC-Sierra, Inc., BC Canada.

* cited by examiner

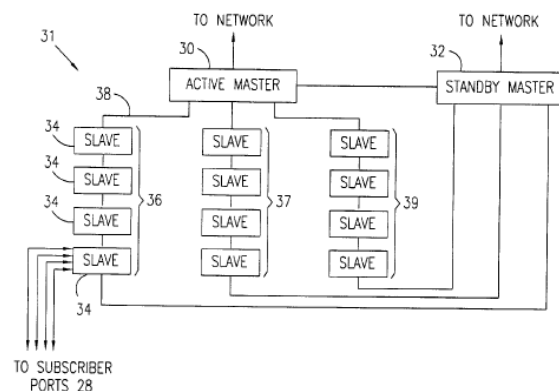
Primary Examiner—Duc Ho

(74) Attorney, Agent, or Firm—Abelman, Frayne &
Schwab

(57) ABSTRACT

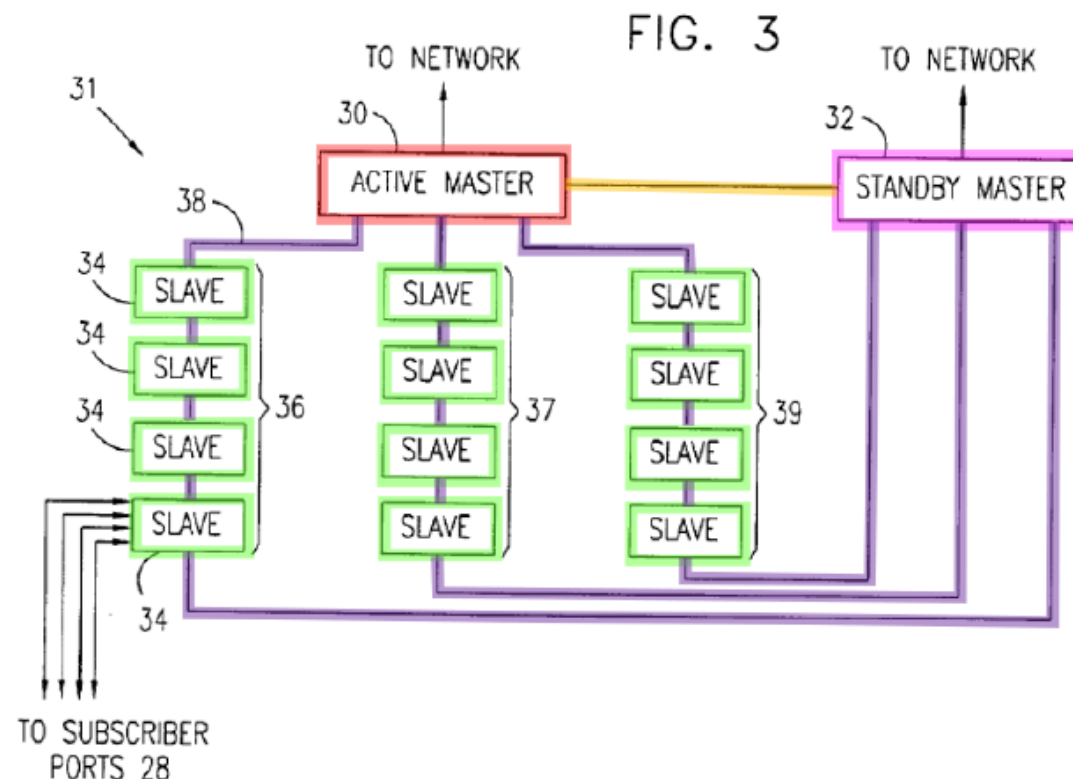
Network access apparatus includes first and second master
units, each having a physical interface to a packet-switched
network. A plurality of slave units, each slave unit having
one or more ports to respective subscriber lines, are linked
by a plurality of physical interface lines in one or more daisy
chains, in which the slave units are mutually connected in
series by the physical interface lines therebetween. Each
daisy chain includes at least a first slave unit connected by
one of the physical interface lines to the first master unit and
a last slave unit connected by another of the physical
interface lines to the second master unit.

26 Claims, 9 Drawing Sheets



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Cisco's Exhibit 1001
Ex. 1001, Page 1

(54) BI-DIRECTIONAL CHAINING OF NETWORK ACCESS PORTS



Ex. 1001 ('904 Patent) at FIG. 3

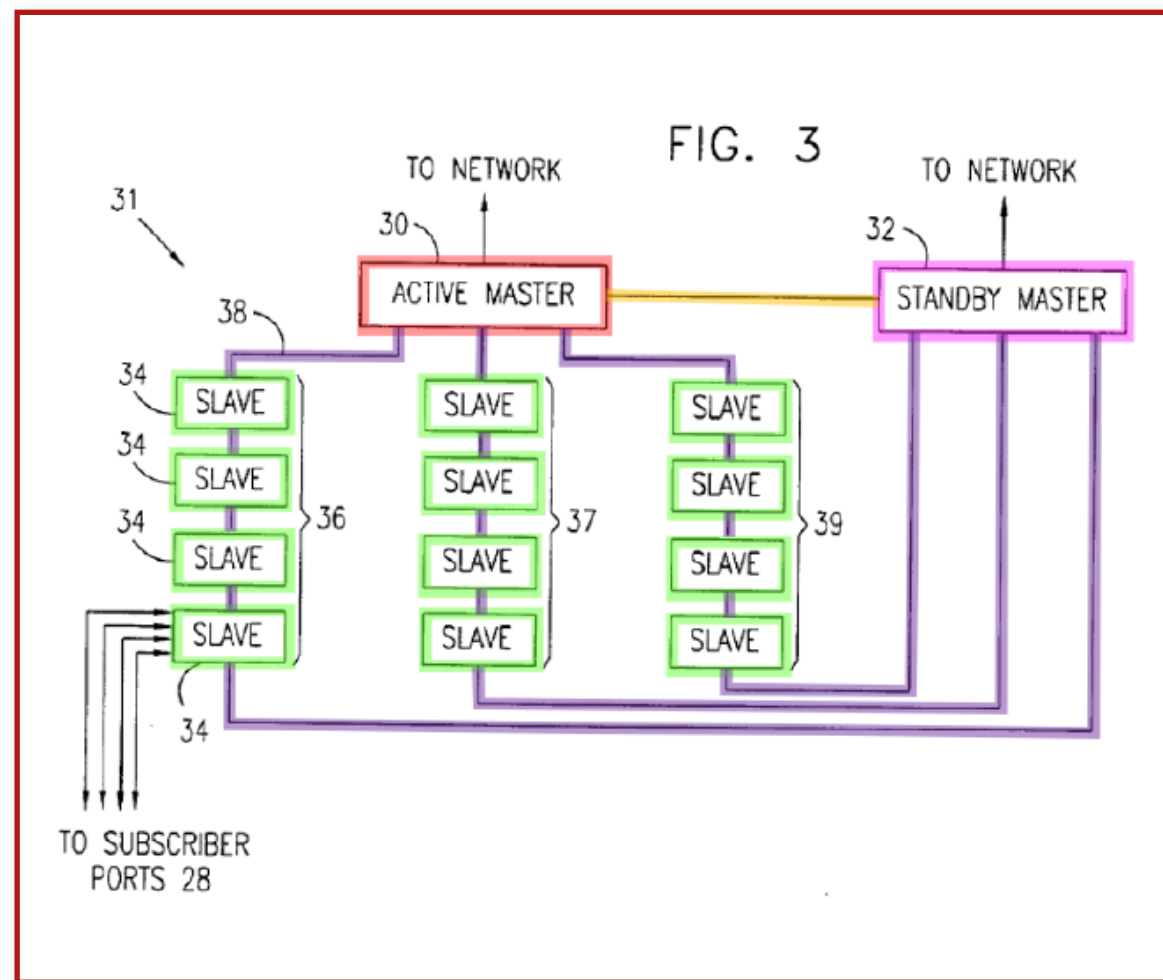
Representative Claim 1 Of The '904 Patent

1. Network access apparatus, comprising:

first and second master units, each comprising a physical interface to a packet-switched network;

a plurality of slave units, each slave unit comprising one or more ports to respective subscriber lines; and

a plurality of physical interface lines, which link the slave units in one or more daisy chains, in which the slave units are mutually connected in series by the physical interface lines therebetween, each daisy chain comprising at least a first slave unit connected one of the physical interface lines to the first master unit, a second slave unit connected to the first slave unit but not to the first or second master unit, and a last slave unit connected by another of the physical interface lines to the second master unit.



Ex. 1001 ('904 Patent) at Claim 1, FIG. 3

Representative Claim 9 Of The '904 Patent

9. Network access apparatus, comprising:

first and second master units, each comprising a physical interface to a packet-switched network;

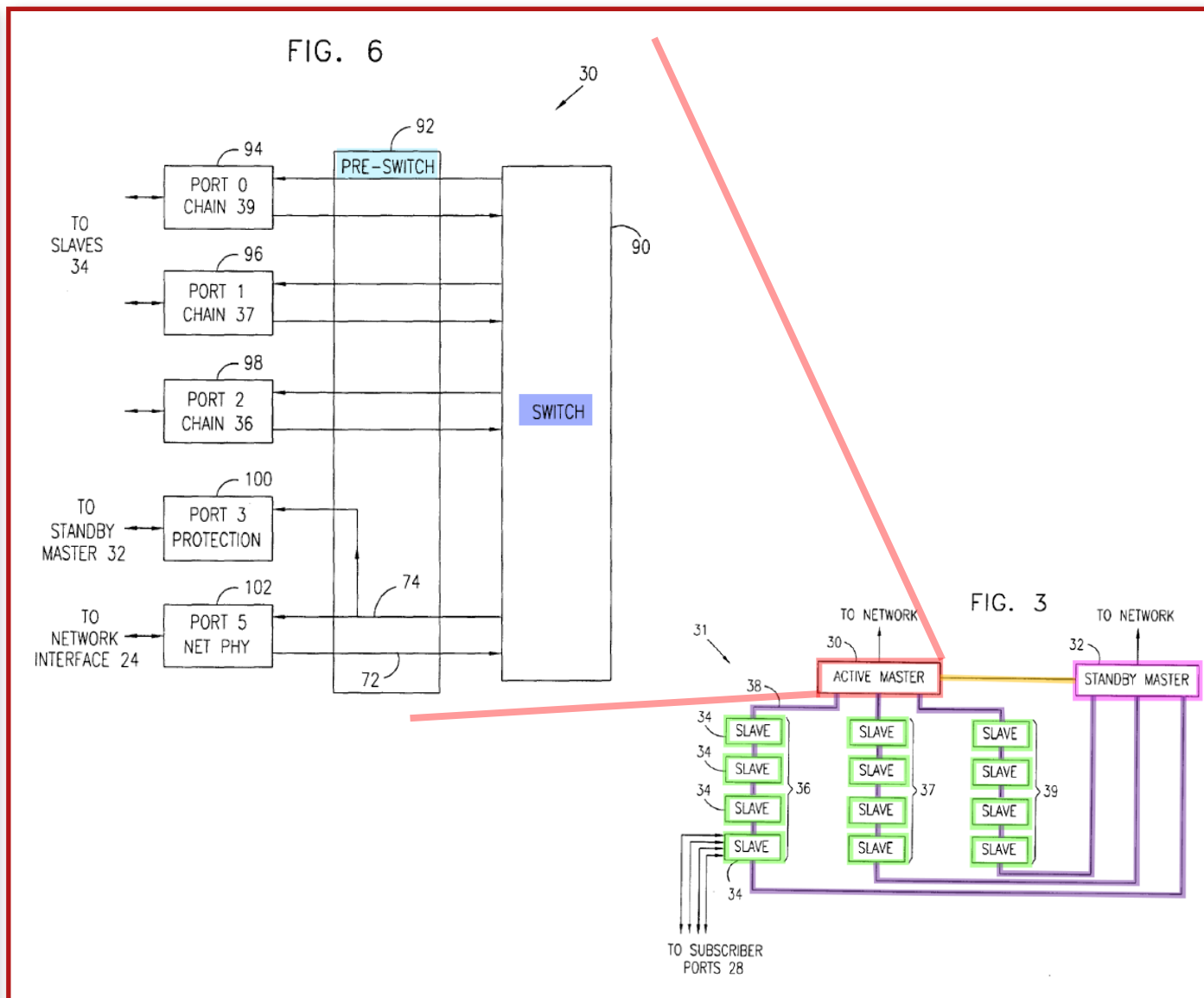
a plurality of slave units, each slave unit comprising one or more ports to respective subscriber lines; and

a plurality of physical interface lines, which link the slave units in one or more daisy chains, in which the slave units are mutually connected in series by the physical interface lines therebetween, each daisy chain comprising at least a first slave unit connected by one of the physical interface lines to the first master unit and a last slave unit connected by another of the physical interface lines to the second master unit,

wherein each of the first and second master units comprises:

a switch, configured to route data packets between the respective physical interface and the one or more daisy chains; and

a pre-switch, which in the event of a fault at a location in one of the daisy chains, re-routes at least a portion of the data packets exchanged with one or more of the slaves in the daisy chain in which the fault has occurred through another one of the daisy chains.

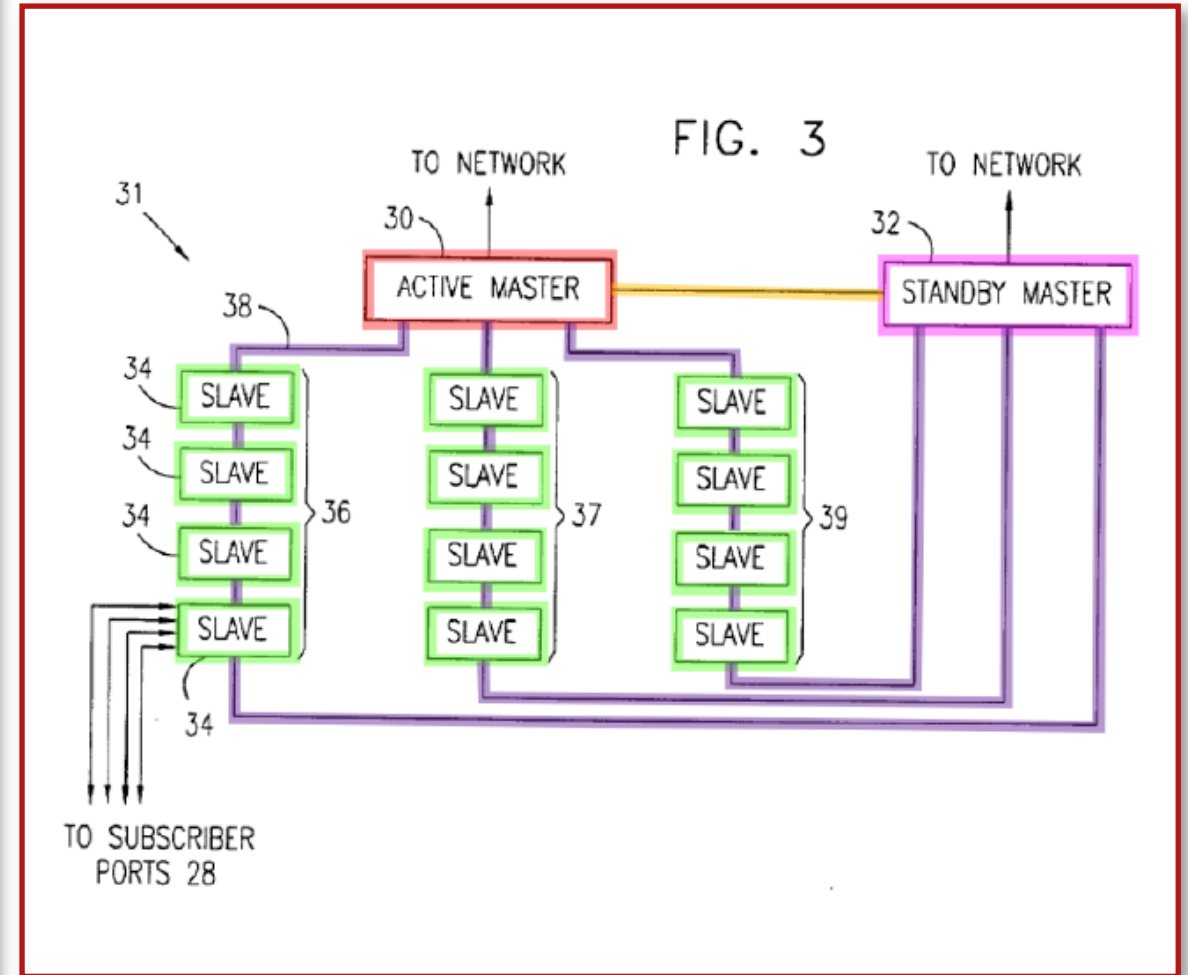


Ex. 1001 ('904 Patent) at Claim 9, FIGS. 3 and 6

Representative Claim 14 Of The '904 Patent

14. In a network access multiplexing system, in which a master unit is connected by a physical interface to a packet-switched network, a slave unit configured to be coupled to the master unit in a daisy chain of such slave units, the slave unit comprising:

- a plurality of ports, for coupling the slave unit to respective subscriber lines;
- first and second physical interfaces, coupled to exchange packets with preceding and succeeding units, respectively, along the daisy chain;
- a pre-switch, coupled to receive packets from the first physical interface and responsive to address data carried by the packets, to sort the packets such that packets addressed to the slave unit are retained, and packets addressed to the succeeding units are passed to the second physical interface; and
- a fabric of one or more switches, which convey the retained packets to the ports, responsive to the address data.



Ex. 1001 ('904 Patent) at Claim 14, FIG. 3

Roadmap

- 1 Overview of the '904 Patent
- 2 Grounds
- 3 Disputed Issues

Grounds

Grounds	Claims	Basis
#1	1-26	Vink with Patrick
#2	1-26	Vink with Patrick and AAPA

Petition at 15

Vink: Two Masters with Serially-Connected Slaves

PCT
WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁵ : H04L 12/28 (21) International Application Number: PCT/NL91/00041 (22) International Filing Date: 18 March 1991 (18.03.91) (30) Priority data: 900668 16 March 1990 (16.03.90) NL (71) Applicant (for all designated States except US): LOCAMATION BEHEER B.V. (NL/NL); Aske Vleerstraat 26, P.O. Box 360, NL-7500 AJ Enschede (NL). (72) Inventors; and (73) Inventor/Applicants (for US only): VINK, Thomas, Gerardus, Alfonsus (NL/NL); Sportlaan 41, NL-7581 BX Losser (NL); JANSEN, Antonius, Jacobus, Paulus (NL/NL); Markweg 16, NL-7582 BD Losser (NL); FULSTRA, Hans (NL/NL); Rembaanstraat 26-6, NL-7523 ZX Enschede (NL).	(11) International Publication Number: WO 91/14324 (43) International Publication Date: 19 September 1991 (19.09.91) (74) Agents: DE BRUIJN, Leendert, C. et al.; Nederlandsch Octrooibureau, Scheveningsweg 82, P.O. Box 29720, NL-2502 LS The Hague (NL). (81) Designated States: AT (European patent), BE (European patent), CA, CH (European patent), DE (European patent), DK (European patent), ES (European patent), FI, FR (European patent), GB (European patent), GR (European patent), IT (European patent), JP, LU (European patent), NL (European patent), NO, SE (European patent), US. Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments. In English translation (filed in Dutch).
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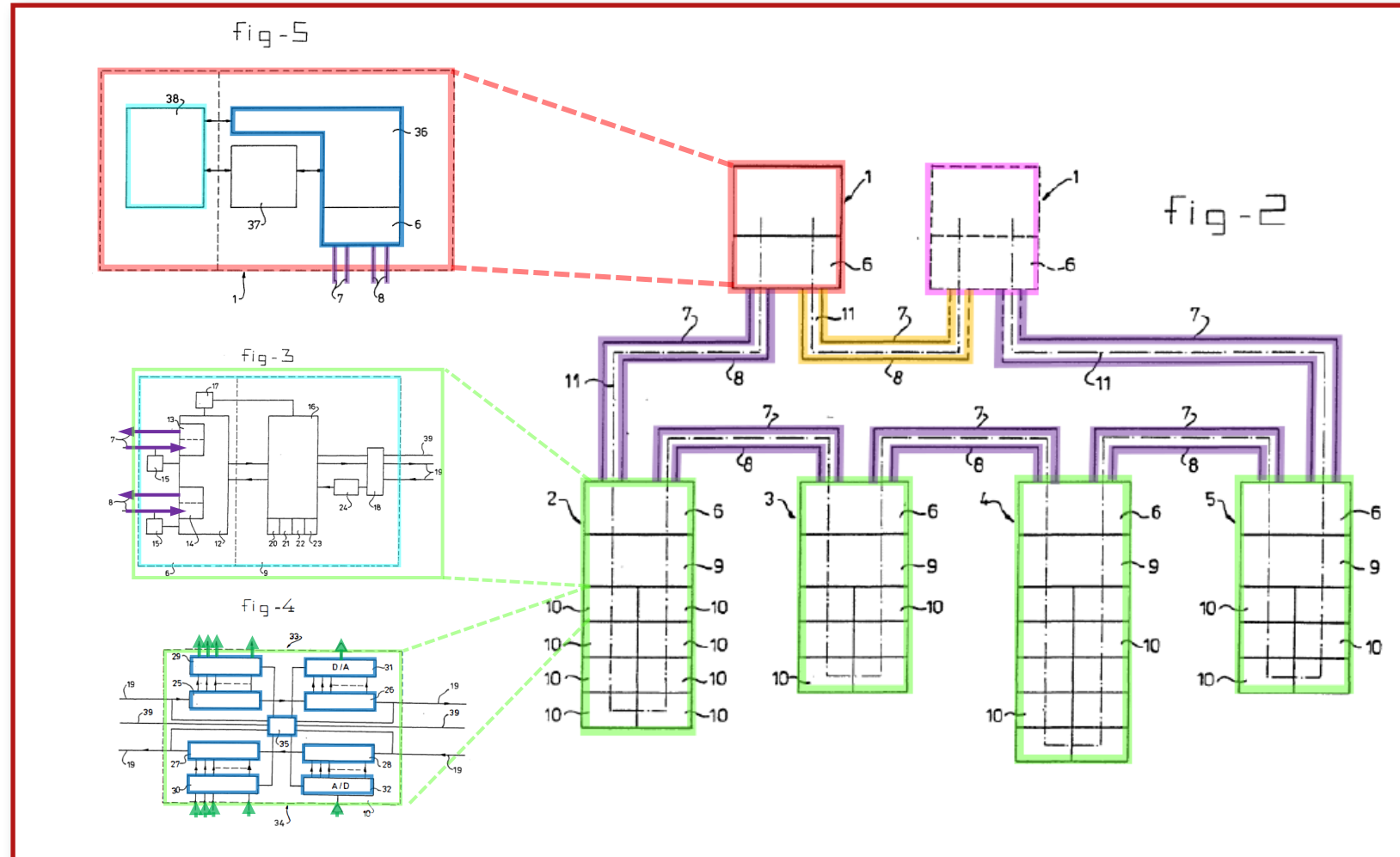
(54) Title: METHOD AND COMMUNICATION SYSTEM FOR THE BIT-SERIAL EXCHANGE OF DATA

(57) Abstract

Method and communication system for serially exchanging data bits with one or more input (I) and/or output (O) modules (10), under the control of at least one master station (1). The I/O modules (10) are connected in cascade to a control module (9) via a local data bus (19) for serial bit transfer. The I/O modules (10) are provided with control means (35) for controlling in a synchronised manner the connected I/O modules (10) in response to control information received from the master (1). The I/O modules (10) can be connected in groups to the at least one master (1) via one or more substations (slaves) (2, 3, 4, 5) and a transmission system (7, 8) for serial bit transfer. The present method and communication system provide unambiguously in the communication of cause-and-effect relationships at I/O level, in particular, for measurement and control applications, monitoring purposes and data acquisition.

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Ex. 1005, Page 1

Masters and slaves each have a **switch** and **pre-switch**



Petition at 15-19

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

EX1018, Page 9

Patrick: Masters and Slaves Connected To External Network

United States Patent [19] Patent Number: 5,790,541
Patrick et al. [45] Date of Patent: Aug. 4, 1998

US005790541A

[54] APPARATUS, METHOD, SYSTEM AND SYSTEM METHOD FOR DISTRIBUTED ROUTING IN A MULTIPPOINT COMMUNICATION SYSTEM

[75] Inventors: Michael W. Patrick, Assonet; Dennis J. Picker, Lincoln; John A. Perreault, Hopkinton, all of Mass.

[73] Assignee: Motorola, Inc., Schaumburg, Ill.

[21] Appl. No.: 626,060

[22] Filed: Apr. 1, 1996

[51] Int. Cl.⁷ H04L 12/56

[52] U.S. Cl. 370/392; 370/402; 370/406

[58] Field of Search 395/200.02, 200.12, 395/200.16; 370/389, 392, 396, 397, 400, 401, 402, 406, 911

[56] References Cited

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84 Claims, 7 Drawing Sheets

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"Multi-LAN Address Resolution," Postel, J., Network Working Group, Request for comments: 925, USC-ISI, Oct. 1984, pp. 1-15.

Primary Examiner—Benedict V. Safourek
Attorney, Agent, or Firm—Nancy R. Gamburd; Jeffrey T. Klayman

[57] ABSTRACT

An apparatus (110, 101), method, system (100) and system method provide for distributed internetwork routing of information in a communication system (100). The communication system (100) is characterized by a topology having a primary node connected to a first network, such as the Internet, and connected via an intermediate network to a multiplicity of secondary nodes, which are further connected via a secondary network to a plurality of terminals, such as personal computers. The apparatus (110, 101), method, system and system method provide for routing of information between the primary node and the terminals independently of and transparently to any internetwork address of a secondary node. The apparatus (110, 101), method, system and system method conserve internetwork addresses by utilizing internetwork addresses only for a primary node and for terminals.

FIG. 1

START 400

RECEIVE A FIRST PACKET HAVING AS A DESTINATION ADDRESS AN INTERNETWORK ADDRESS OF A FIRST TERMINAL 405

FORM A SECONDARY MAC NETWORK PACKET FROM THE FIRST PACKET 410

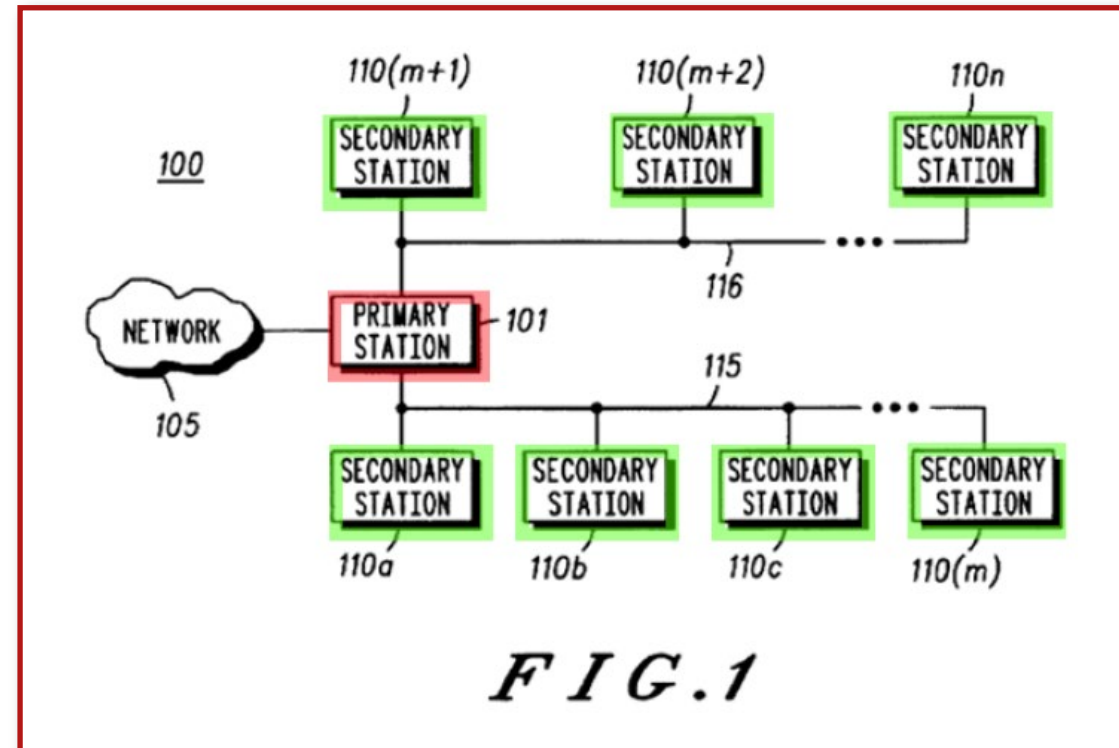
ENCAPSULATE THE SECONDARY MAC NETWORK PACKET IN AN INTERMEDIATE NETWORK PACKET HAVING, AS A DESTINATION ADDRESS, AN INTERMEDIATE NETWORK ADDRESS OF A SECONDARY NODE CORRESPONDING TO THE TERMINAL 415

TRANSMIT THE INTERMEDIATE NETWORK PACKET TO THE SECONDARY NODE 420

RETRANSMIT THE SECONDARY MAC NETWORK PACKET TO THE TERMINAL 425

RETURN 430

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Ex. 1006, Page 1



such as communication media 115 and 116. Equivalently, the secondary stations 110_a through 110_n, may be connected to more than one primary station, and may be connected to a primary station (such as primary station 101) utilizing more or fewer branches, segments or sections of any communication medium.

Petition at 20-21; Ex. 1006 (Patrick) at 3:27-32, FIG. 1

AAPA: Masters and Slaves Connected To External Network

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

(10) **Patent No.:** US 6,680,904 B1
(45) **Date of Patent:** Jan. 20, 2004

(54) **BI-DIRECTIONAL CHAINING OF NETWORK ACCESS PORTS**

(75) **Inventors:** Menachem Kaplan, Petach Tikva (IL); David Zelig, Givatim (IL); Roy Kinamon, Tel Aviv (IL); Eli Aloni, Tzur-Igal (IL); Ron Sdayoor, Kiryat (IL); Eric Paneth, Givatim (IL); Eli Magal, Tel Aviv (IL)

(73) **Assignee:** Orckit Communications Ltd., Tel Aviv (IL)

(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) **Appl. No.:** 09/472,683

(22) **Filed:** Dec. 27, 1999

(51) **Int. Cl.:** G01R 31/08; H04L 12/66; H04L 12/28; H04L 3/16

(52) **U.S. Cl.:** 370/217; 370/352; 370/392; 370/395.1; 370/465

(58) **Field of Search:** 370/216, 217, 370/352-356, 389, 392, 395.1, 465, 466; 340/2.28, 2.24; 710/110, 129, 131, 132; 712/31, 39; 709/208, 209, 225, 229; 375/222

(56) **References Cited**

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6,219,354 B1 * 4/2001 Fink et al. 370/463
6,317,415 B1 * 11/2001 Danell et al. 370/230
6,345,051 B1 * 2/2002 Gupta et al. 370/395.2
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Dave Allen et al., "An "Optimized for ATM" ADSL Access Architecture using SDP", 7 pages, ADSL Forum 98-221, Nov. 17th to 20th, 1998, Los Angeles, CA, USA.
"Vortex Chip Set: Introduction", Preliminary Issue 1, 16 pages, Jun. 1999, PMC-Sierra, Inc., BC Canada.

* cited by examiner

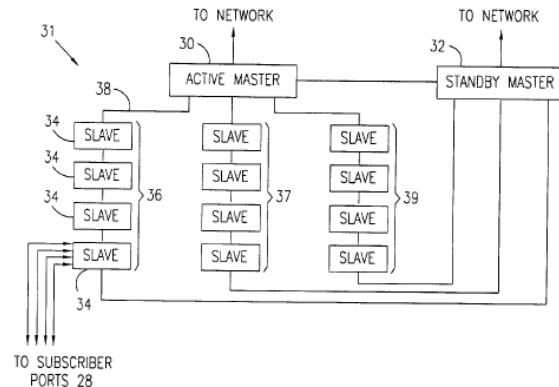
Primary Examiner—Duc Ho

(74) **Attorney, Agent, or Firm**—Abelman, Frayne & Schwab

ABSTRACT

Network access apparatus includes first and second master units, each having a physical interface to a packet-switched network. A plurality of slave units, each slave unit having one or more ports to respective subscriber lines, are linked by a plurality of physical interface lines in one or more daisy chains, in which the slave units are mutually connected in series by the physical interface lines therebetween. Each daisy chain includes at least a first slave unit connected by one of the physical interface lines to the first master unit and a last slave unit connected by another of the physical interface lines to the second master unit.

26 Claims, 9 Drawing Sheets



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Cisco's Exhibit 1001
Ex. 1001, Page 1

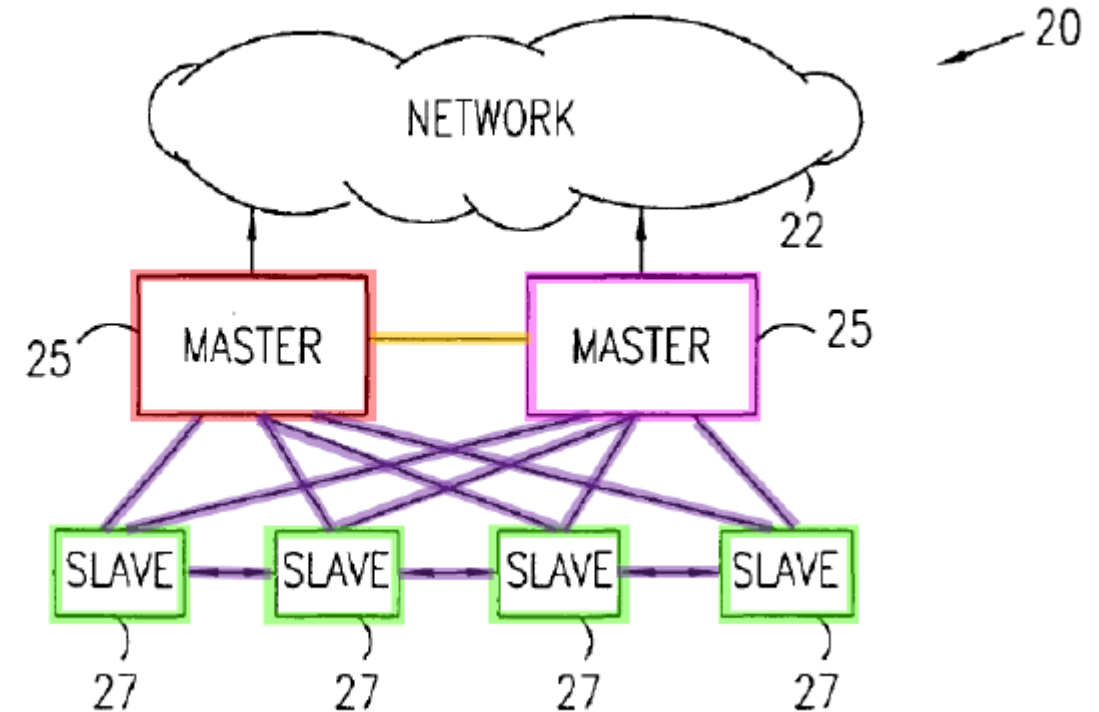


FIG. 2B
PRIOR ART

Petition at 27

Roadmap

- 1 Overview of the '904 Patent
- 2 Grounds
- 3 Disputed Issues

Disputed Issues

- 1) All Claims: “Subscriber Lines”
- 2) All Claims: “Physical Interface To A Packet-Switched Network”
- 3) Claim 4: Conveying Packets In Opposite Directions
- 4) Claim 9: “Switch” and “Pre-Switch”
- 5) Claims 6 And 23: “Bicasting”
- 6) Claim 20: “Initial” And “Further Downstream Data”
- 7) Claim 8: First Master Unit Already Received Downstream Data
- 8) Claim 17: “Multicast Packet”

Disputed Issue #1

All Claims: “Subscriber Lines”

Patent Owner Proposes A Construction of “Subscriber Lines”

1. Network access apparatus, comprising:
first and second master units, each comprising a physical interface to a packet-switched network;
a plurality of slave units, each slave unit comprising one or more ports to respective subscriber lines; and
a plurality of physical interface lines, which link the slave units in one or more daisy chains, in which the slave units are mutually connected in series by the physical interface lines therebetween, each daisy chain comprising at least a first slave unit connected one of the physical interface lines to the first master unit, a second slave unit connected to the first slave unit but not to the first or second master unit, and a last slave unit connected by another of the physical interface lines to the second master unit.

Ex. 1001 ('904 Patent) at Claim 1

For the purposes of this Response, Patent Owner submits that “subscriber lines” should be construed as “communication lines to users of subscription-based network services.” The term “subscriber lines” appears in all of the independent

POR at 20

Patent Owner's Proposed Construction Applies Only Against Vink Alone

Under Plain and Ordinary Meaning, Vink Teaches “Subscriber Lines”

output side (33).”), *id.*, 19:19-23. These **inputs and outputs** also include connections to **subscriber lines** because the I/O modules 10 are connected to other devices. *Id.*, 7:9-16 (“The sampling instants of I/O modules or *the devices connected thereto* can be accurately set by means of the control information supplied, as intended.”). Vink further makes clear that data from the **master 1**

Petition at 33

Patent Owner Argues That Vink Does Not Teach “Subscriber Lines”

In contrast to the claims of the '904 Patent, **Vink** does not teach “subscriber lines” under any reasonable interpretation. Vink teaches that its slaves are devices connected by I/O modules 10 to peripherals—not subscribers. Ex. 1005, 1:6-34.

POR at 45

Patrick/AAPA Teach “Subscriber Lines” Even Under Patent Owner’s Proffered Construction

No Construction Needed: Patrick/AAPA Teach “Subscriber Lines” Even Under Patent Owner’s Proffered Construction

Both Patrick and AAPA explicitly teach “subscriber lines” and “ports.”

For example, Patrick teaches that the secondary stations can be considered “subscriber access units.” Ex-1006, 1:21-27 (“In the CableComm™ system, a

Petition at 33

AAPA also teaches [1b], [4b], [9b], and [11b].² For example, AAPA teaches that “[e]ach slave unit typically comprises a switching core 29, coupled to a plurality of ports 28 serving respective subscriber premises via suitable DSL modems.” Ex-1001, 1:45-48. See Ex-1003, ¶109.

It would have been obvious to combine the teachings of Vink with Patrick (and AAPA for Ground 2) to include one or more ports to respective subscriber lines. Providing ports to connect one device (e.g., the slave including an I/O

Petition at 35

Patrick/AAPA Teach “Subscriber Lines” Even Under Patent Owner’s Proffered Construction

Petition Clearly Articulated The Obviousness Of The Proposed Combination

(*subscriber access unit.*”), *id.*, 1:60-64. Indeed, Patrick teaches that the **secondary stations 110a-110n** (i.e., the claimed “slave units”) contain an “interface 170, such as an *ethernet port* or an RS232 interface, *for connection to a computer, workstation, or other data terminal equipment.*” Ex-1006, 4:59-5:1. Hence, Patrick teaches the claimed “**ports**” (e.g., **ethernet port**) and “subscriber access lines” (e.g., **connections to data terminal equipment**) that are connected to the **slave units** (i.e., the **secondary stations** that provide access to subscribers). *See* Ex-1003, ¶¶106-08.

AAPA also teaches [1b], [4b], [9b], and [11b].² For example, AAPA teaches that “[e]ach slave unit typically comprises a switching core 29, coupled to a plurality of ports 28 serving respective subscriber premises via suitable DSL modems.” Ex-1001, 1:45-48. *See* Ex-1003, ¶109.

It would have been obvious to combine the teachings of Vink with Patrick (and AAPA for Ground 2) to include one or more ports to respective subscriber lines. Providing ports to connect one device (e.g., the slave including an I/O module) to other “devices connected [to I/O modules]” (Ex-1005, 7:15) is one of the most fundamental ways to connect two different devices together. For example, ethernet ports were known long before the priority date of the ’904 patent and implementing such ports to the input/output side of Vink’s I/O modules in the slave units would have been a trivial modification a POSITA would have been able to implement with a reasonable expectation of success. And having those “devices connected [to I/O modules]” (Ex-1005, 7:15) be connected to subscriber lines (e.g., devices found at “subscriber premises,” Ex-1002, 159), would have been a trivial modification. *See* Ex-1003, ¶110.

Patrick/AAPA Teach “Subscriber Lines” Even Under Patent Owner’s Proffered Construction

PO’s Argument That Modems Provide **Direct** Access To An External Network And Obviate The Need For Network Access Through Vink’s Masters Is Incorrect

To overcome these facts, Petitioner incorrectly asserts that Mr. Gomez identified modems as potential peripherals servicing subscribers. Reply, 15-16. There are two problems with this assertion. First, Vink does not disclose modems as potential peripherals. Second, modems would provide Vink’s non-subscriber stations **direct** access to an external network, thus obviating the need for network access through physical interfaces in Vink’s masters, *i.e.*, in the manner claimed in the '904 Patent. Rather than support Petitioner’s purported motivation to combine,

Sur-Reply at 11

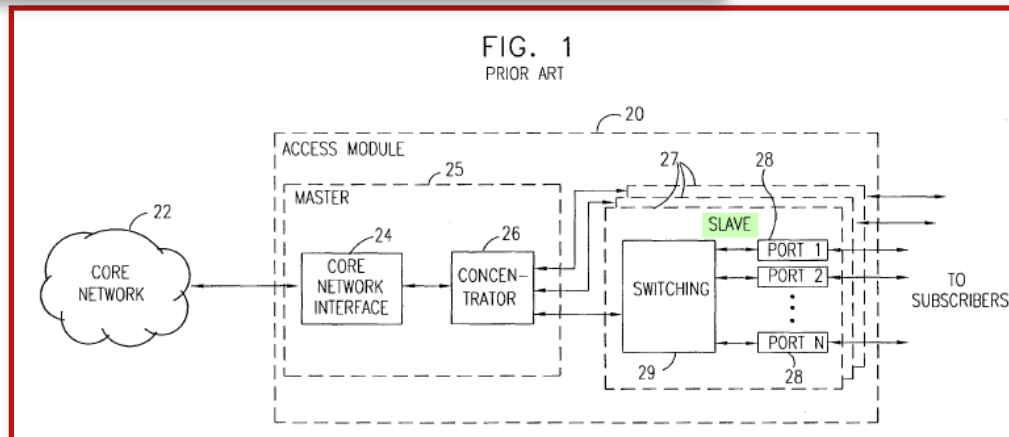


FIG. 1 is a block diagram that schematically illustrates a DSLAM system 20 implementing a multi-shelf architecture, as is known in the art. System 20 comprises a master unit 25 coupled to multiple slave units 27 in a star configuration. Master unit 25 communicates with a core network 22, such as an ATM network. The master unit comprises a core network interface element 24, providing the necessary physical layer (PHY) and data link layer (for example, ATM) functions. A concentrator 26 performs higher-level functions, including VPI/VCI translation for the ATM network, and multiplexes downstream and upstream packets, or cells, among slave units 27. Each slave unit typically comprises a switching core 29, coupled to a plurality of ports 28 serving respective subscriber premises via suitable DSL modems. In the physical implementation of system 20, each such slave unit occupies its own shelf in an electronics rack, and this is the reason for the use of the term “multi-shelf.”

Petition at 35; Ex. 1001 ('904 Patent) at 1:45-48

Disputed Issue #2

All Claims: “Physical Interface To A Packet-Switched Network”

Patent Owner Additionally Requires An “*External, Core*” Network

1. Network access apparatus, comprising:
first and second master units, each comprising a physical interface to a packet-switched network;
a plurality of slave units, each slave unit comprising one or more ports to respective subscriber lines; and
a plurality of physical interface lines, which link the slave units in one or more daisy chains, in which the slave units are mutually connected in series by the physical interface lines therebetween, each daisy chain comprising at least a first slave unit connected one of the physical interface lines to the first master unit, a second slave unit connected to the first slave unit but not to the first or second master unit, and a last slave unit connected by another of the physical interface lines to the second master unit.

Ex. 1001 ('904 Patent) at Claim 1

the second master unit.” Given that the masters must provide an interface to a packet-switched network, a POSA would thus readily understand that the claimed “packet-switched network” is a “core” network that is external to the one or more loops formed by the two masters and each of the daisy chains. Ex. 2005, ¶¶56-57. That the masters provide an interface to an external, core network—i.e., a subscriber-based network such as the internet—is further reinforced by the requirement in the claims that each of the slave units comprise ports leading to “subscriber lines.” *Id.* Accordingly, the presence of an external network—and that the claimed master units provide an interface to such a network—is a key limitation of the claims in the '904 Patent. As explained below, Vink fails to disclose this limitation and to render it

POR at 25

Patent Owner Attempts To Read Embodiments Into The Claims

Third, the '904 Patent specification describes the preferred embodiment of the invention as a “multi-shelf access system.” POR, 24-25. A POSA would understand that a “multi-shelf access system” with masters is used to provide subscribers with access to a “core” network via slaves that interface with the network through those masters. Ex2025, ¶¶56-57. Further, there are no disclosed embodiments in which masters do not provide access to a “core” network.

Sur-Reply at 3



“[A] particular embodiment appearing in the written description may not be read into a claim when the claim language is broader than the embodiment.”

Superguide Corp. v. DirecTV Enterprises, Inc., 358 F.3d 870, 875, (Fed. Cir. 2004)

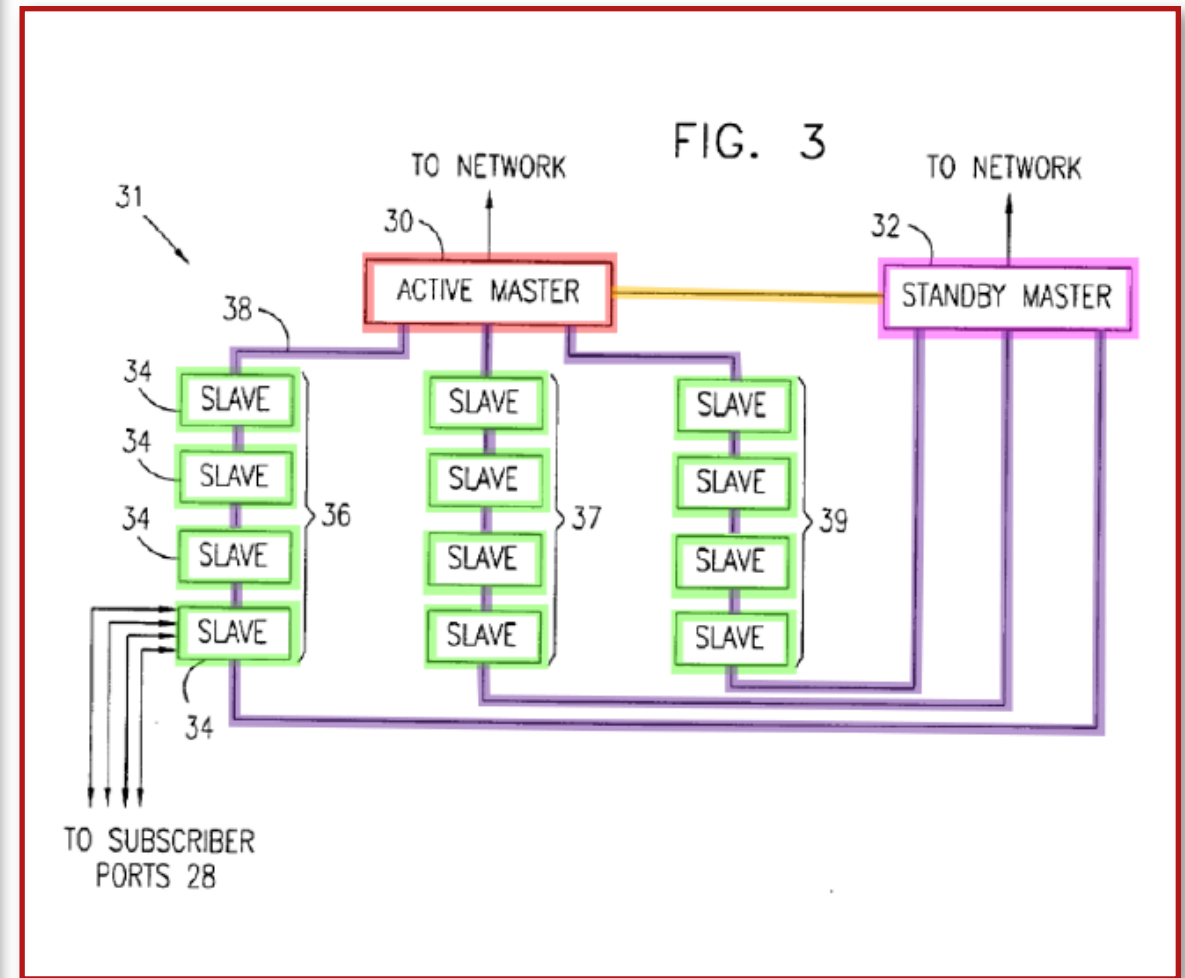
Reply at 7

Patent Owner Misinterprets The Claims

“Physical Interface” Encompasses Connections Between The Slave Units In The “Internal” Network

14. In a network access multiplexing system, in which a master unit is connected by a physical interface to a packet-switched network, a slave unit configured to be coupled to the master unit in a daisy chain of such slave units, the slave unit comprising:

- a plurality of ports, for coupling the slave unit to respective subscriber lines;
- first and second physical interfaces, coupled to exchange packets with preceding and succeeding units, respectively, along the daisy chain;
- a pre-switch, coupled to receive packets from the first physical interface and responsive to address data carried by the packets, to sort the packets such that packets addressed to the slave unit are retained, and packets addressed to the succeeding units are passed to the second physical interface; and
- a fabric of one or more switches, which convey the retained packets to the ports, responsive to the address data.



Ex. 1001 ('904 Patent) at Claim 14, FIG. 3

Patent Owner's Sur-Reply Arguments Lack Merit

“Physical interface” vs. “physical interface lines”

1. Network access apparatus, comprising:
first and second master units, each comprising a physical interface to a packet-switched network;
a plurality of slave units, each slave unit comprising one or more ports to respective subscriber lines; and
a plurality of physical interface lines, which link the slave units in one or more daisy chains, in which the slave units are mutually connected in series by the physical interface lines therebetween, each daisy chain comprising at least a first slave unit connected one of the physical interface lines to the first master unit, a second slave unit connected to the first slave unit but not to the first or second master unit, and a last slave unit connected by another of the physical interface lines to the second master unit.

Ex. 1001 ('904 Patent) at Claim 1

Second, the claims already recite that the “first slave” is connected to the “first master unit” and the “last slave” is connected to the “second master unit.”’904 Patent, 11:50-55. Construing the masters’ physical interface as a connection to the slave units would thus be improperly redundant.

Sur-Reply at 3

Patent Owner's Sur-Reply Arguments Lack Merit

Sur-Reply argument directed to the preamble

First, elements 1b/4b/9b/11b of the independent claims recite “subscriber lines” (the construction of which Petitioner does not dispute), *i.e.*, communication lines to users of subscription-based network services. The masters in the “network access apparatuses” must therefore provide the slaves servicing these “subscribers” with access to an external (or “core”) network. Construing the masters’ physical network interfaces as internal interfaces—rather than interfaces to an external “core” network—would defeat the purpose of the claimed network access apparatuses by improperly eliminating the network access they provide to the claimed subscribers.

1. Network access apparatus, comprising:
first and second master units, each comprising a physical interface to a packet-switched network;
a plurality of slave units, each slave unit comprising one or more ports to respective subscriber lines; and
a plurality of physical interface lines, which link the slave units in one or more daisy chains, in which the slave units are mutually connected in series by the physical interface lines therebetween, each daisy chain comprising at least a first slave unit connected one of the physical interface lines to the first master unit, a second slave unit connected to the first slave unit but not to the first or second master unit, and a last slave unit connected by another of the physical interface lines to the second master unit.

Ex. 1001 ('904 Patent) at Claim 1

Sur-Reply at 3

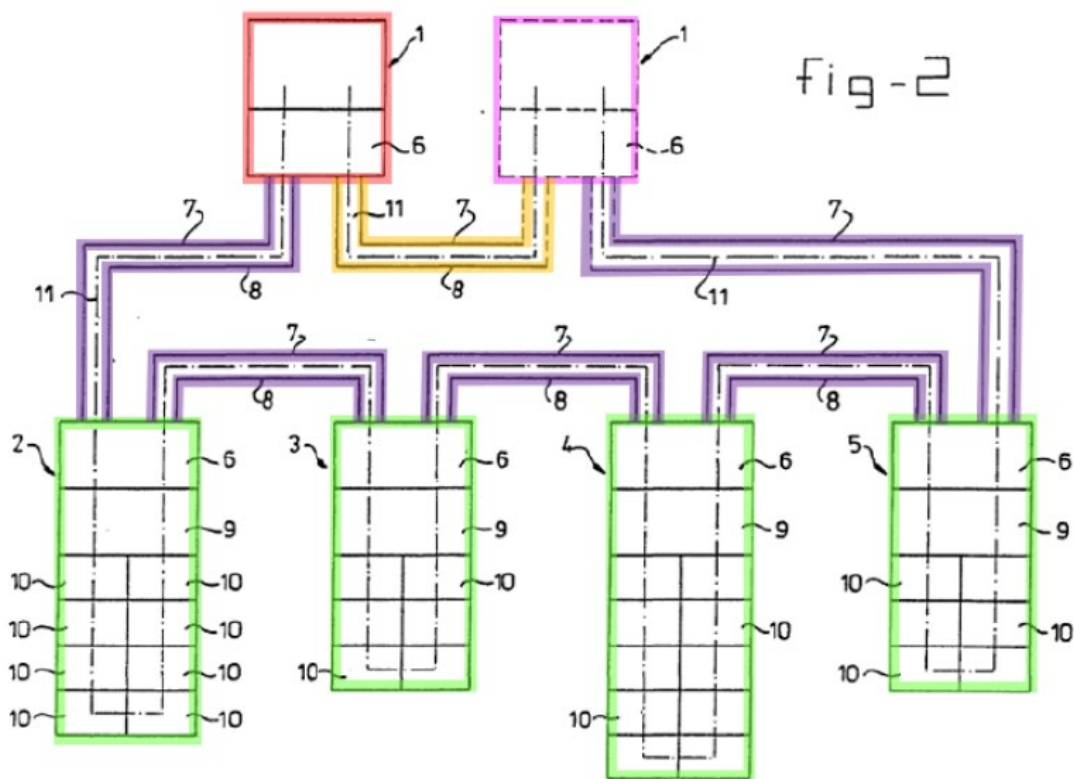
Proof #1: Vink's Internal Network Satisfies The Claims

Petitioner argues for the first time in the Reply that Vink's "internal" network satisfies the claimed physical interface to a packet switched network. Reply, 9-10. This argument fails.

Sur-Reply at 4

In any event, there is no evidence that Vink's "internal" network is a packet-switched network as claimed. Petitioner has never alleged that the connections between a master and a slave form a packet-switched network or introduced evidence to support this assertion.

Sur-Reply at 6



Petition at 24-26; Ex. 1005 (Vink) at Fig. 2

b) [1a/4a/9a/11a] **first [master]** and **second master units**, each comprising a **physical interface to a packet-switched network**;

The **two masters** and the **plurality of slave units** exchange data packets via **transmission lines 7, 8**. See Ex-1005, 14:28-34 ("at least one master and slaves are designed to transmit or receive packets of data bits via a transmission system ring in one and/or the other direction."), *id.*, 22:1-9, 15:28-35 ("The transmission lines 7, 8 may, for example, consist of coaxial cable, optical fibre cable and the like."), 1:11-15. Ex-1003, ¶¶95-96.

Petition at 24-26

Proof #1: Vink's Internal Network Satisfies The Claims

Purported Admission Is From Preamble

First, the Petition admits that Vink does not disclose masters accessing core networks:

Sur-Reply at 4

a) [1pre/4pre/9pre/11pre] Network access apparatus, comprising:

Although Vink does not explicitly teach that master 1 accesses a network, master stations connected to networks were well-known. For example, as shown below, Patrick discloses a “communication system ... characterized by a topology having a primary node connected to a first network, such as the Internet.” Ex-1006, Abstract. And although only a single primary station is depicted in Figure 1, Patrick teaches “more than one primary station.” Ex-1006, 3:27-32. See Ex-1003, ¶¶76-77.

Petition at 19-20

In The Actual Limitations, Petition Made Clear Distinctions Between Internal and External Networks

b) [1a/4a/9a/11a] first [master] and second master units, each comprising a physical interface to a packet-switched network;

The two masters and the plurality of slave units exchange data packets via transmission lines 7, 8. See Ex-1005, 14:28-34 (“at least one master and slaves are designed to transmit or receive packets of data bits via a transmission system ring in one and/or the other direction.”), *id.*, 22:1-9, 15:28-35 (“The transmission

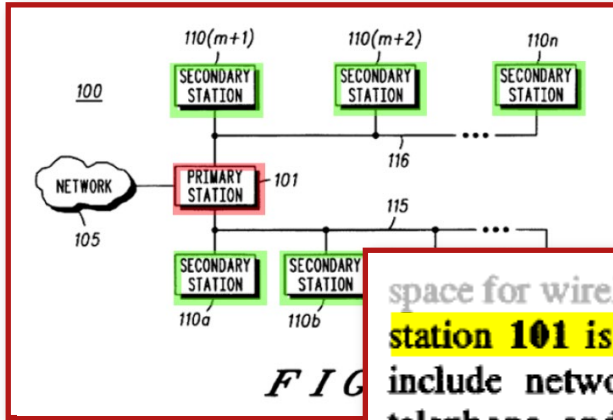
• • • • •

Vink with Patrick (and AAPA for Ground 2) suggests masters with a physical interface to an external packet-switched network. As explained above in

Petition at 24-26

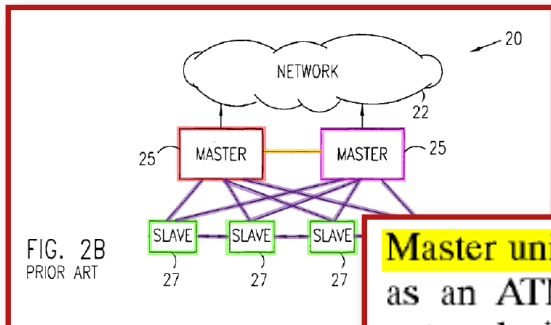
Proof #2: Patrick's/AAPA's External Network Satisfies The Claims

Connecting Masters and Slaves – And In Particular LANs – To External Networks Was Routinely Done



space for wireless and satellite communication. The primary station 101 is also coupled to a network 105, which may include networks such as the Internet, on line services, telephone and cable networks, and other communication systems. The secondary stations 110_a through 110_n are

Petition at 20-24 ; Ex. 1006 (Patrick) at 3:20-24



Master unit 25 communicates with a core network 22, such as an ATM network. The master unit comprises a core network interface element 24, providing the necessary physical layer (PHY) and data link layer (for example, ATM) functions. A concentrator 26 performs higher-level

Petition at 20-31; Ex. 1001 ('904 Patent) at 1:38-42

With reference to FIG. 1, a plurality of clients 101-1-101-N are connected to a local area network (LAN) 102, such as an Ethernet. LAN 102, which, in turn, is connected through a router 103 to a Level 4 (L4) switch 104 (proxy redirector) which interfaces the LAN with a wide area network (WAN) 105, such as the Internet. Although shown

Reply at 16-18; Ex. 1014 (Cohen) at 6:23-28

The internet is a well-known communications system that routes packets based on internet addresses. In a typical internet communication, a user exchanges internet packets with an internet gateway over a local telephone line or local area network. The internet gateway transfers the packets to

Reply at 16-18; Ex. 1016 (Khuc) at 1:21-25

Proof #2: Patrick's/AAPA's External Network Satisfies The Claims

Numerous Off-The-Shelf Solutions Existed At The Time To Make The Proposed Combination



Henry Hou
(Petitioner)

- Q. What were the functionalities that a person of ordinary skill in the art would have to program in software in order to modify Vink's system in view of Patrick's teachings to provide the option in Vink's system for the master units to be connected to an external packet switched network?

.....

- A. So, you know, to the extent that a POSITA may have actually started with a – an available operating system already, it may have already included all the code necessary. ... ***[P]rior to the filing date of ... the '904 patent there were open source operating systems available like LINUX, Red Hat, a number of operating systems like that.*** And there are lots of operating systems and computer systems on which users could easily implement and create systems like that disclosed in Vink and – and other systems for the software that's required.

Reply at 16; Ex. 2027 (Houh Dep. Tr.), 110:4-113:24

Proof #2: Patrick's/AAPA's External Network Satisfies The Claims

Compatible Systems: Vink Discloses Both Sequential Addressing Scheme and Hierarchical Addressing Scheme

By means of the implicit addressing used, which is based on the sequence of the connected I/O modules, the invention makes optimum use of the transparent structure of a serial communication system, in contrast to the said European Patent Application 0,253,381, in which every I/O module has to be addressed separately.

Yet a further embodiment of the method according to the invention, with which only the data bits intended for, and originating from the I/O modules connected to a local data bus are transferred on said data bus, comprises the steps of:

- adding address information, under the control of the at least one master (1), to the data bits intended for the I/O modules (10) connected to a respective slave (2, 3, 4, 5), and
- detecting the address information by the slaves (2, 3, 4, 5) and only exchanging with the connected I/O modules (10) the data bits intended therefor.

Petition, 62-63, 81; Ex. 1005 (Vink) at 8:19-34

Proof #2: Patrick's/AAPA's External Network Satisfies The Claims

Compatible Systems: Vink's Two-level **Hierarchical Addressing Scheme** Is Just Like The '904 Patent's

each slave comprises a pre-switch, which examines each packet passed down its respective chain to determine whether the packet is destined for any of the ports on that slave. Preferably, every packet passed between the masters and slaves has a pre-switch address. If the packet is addressed to a particular slave, the pre-switch on that slave conveys the packet to a switch or switching fabric of the slave, which routes the packet to the appropriate port. If the

Ex. 1001 ('904 Patent) at 2:29-36

If the PSA corresponds to this slave 34, a port number (PORT 0) is appended to the packet. This port is

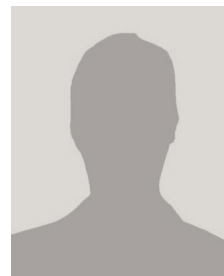
Ex. 1001 ('904 Patent) at 7:34-35

- Q. So **one level** of the hierarchy would be **the pre-switch address** and the **second level** would be the **port address**?
- A. That's one possible embodiment.

Reply at 12: Ex. 1013 (Gomez Dep. Tr.) at 128:2-14

respective slaves to the data to be exchanged. In order, however, to allow the slaves to operate mutually as independently of one another as possible with retention, of course, of the deterministic operation of the communication system as a whole, it is advantageous to provide a slave with an unambiguous address and to add address information bits to the data bits to be exchanged. The

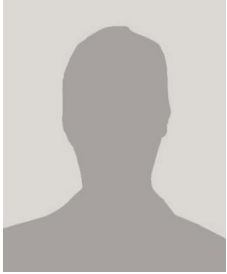
Ex. 1005 (Vink) at 11:29-37



Miguel Gomez
(Patent Owner Expert)

Proof #2: Patrick's/AAPA's External Network Satisfies The Claims

Compatible Systems: Vink's Sequential Addressing Scheme Is Just Like The '904 Patent's



Dr. Henry Houh
(Petitioner's Expert)

- Q. Have you encountered such a nonhierarchical address system ...?
- A. ... Vink talks about addressing in some sort of order ... So ... the ordering ... is not necessarily hierarchical there because it's based on ordering of the devices.

Sur-Reply at 7; Ex. 2027 (Houh Dep. Tr.) at 54:19-55:2

Further, Vink expressly discloses a non-hierarchical (or flat) address system, in which each slave is assigned a fixed address based on its position in the cascade sequence employed in the Vink LAN. Ex. 2005, ¶¶67-68. In particular, Vink states

POR at 34

packet on down the chain. The pre-switch similarly accepts packets carrying a "next" address, i.e., packets that are sent from one slave to its immediate neighbor for topology detection and diagnostics. Otherwise, the pre-switch rejects

Ex. 1001 ('904 Patent) at 2:41-44

Proof #2: Patrick's/AAPA's External Network Satisfies The Claims

The Petition Articulated Reasons To Combine Vink With Patrick

It would have been obvious to combine the teachings of Vink with Patrick (and AAPA for Ground 2). Vink discloses a communication system that is “known per se,” such as “Local Area Networks (LAN’s),” Ex-1005, 1:11-15, but Vink is not limited to a LAN. See Ex-1005, 22:10-14; Ex-1003, ¶¶74-79.

It would have been obvious to combine the teachings of Patrick (and AAPA for Ground 2) to Vink’s communication system by connecting Vink’s masters to a known network, such as those taught by Patrick and/or AAPA, to achieve the well-known benefits of gaining access to an external network. See Ex-1006, 3:20-24;

communications. See Ex-1006, 1:34-40. And subscribers connected to Vink’s communication system would have benefitted by gaining access to a wider array of information that is available on the external network, such as information available on other computers/servers. This was done routinely in the art, and a POSITA

Petition at 22-24; see also id., 35-36, 43-44, 51-55, 69-70



“‘Universal’ motivations known in a particular field to improve technology provide ‘a motivation to combine prior art references even absent any hint of suggestion in the references themselves.’ ... Nothing more is required to show a motivation to combine under KSR....”

Intel Corp. v. PACT XPP Schweiz AG, 61 F.4th 1373, 1380-81 (Fed. Cir. 2023)

Proof #2: Patrick's/AAPA's External Network Satisfies The Claims

Patent Owner's Conclusory Teaching Away Argument: No Objective Evidence

For example, a POSA would know that providing subscriber devices on a LAN (e.g., computers or other peripherals) with access to an external packet-switched network (such as the Internet), those devices and other network elements (e.g., slaves) would require the assignment of a hierarchical address, which Vink effectively teaches against. Ex. 2005, ¶¶62-64.

POR at 29

Further, Vink expressly discloses a non-hierarchical (or flat) address system, in which each slave is assigned a fixed address based on its position in the cascade sequence employed in the Vink LAN. Ex. 2005, ¶¶67-68. In particular, Vink states

POR at 34

“[T]he cited declaration testimony is conclusory and unsupported, adds little to the conclusory assertion for which it is offered to support, and is entitled to little weight.”

Xerox Corp. v. Bytemark, Inc., IPR2022-00624, Paper 9, 15-16 (Aug. 24, 2022) (precedential)



Disputed Issue #3

Claim 4: Conveying Packets In Opposite Directions

Claim 4 of the '904 Patent

4. Network access apparatus, comprising:
first and second master units, each comprising a physical interface to a packet-switched network;
a plurality of slave units, each slave unit comprising one or more ports to respective subscriber lines; and
a plurality of physical interface lines, which link the slave units in one or more daisy chains, in which the slave units are mutually connected in series by the physical interface lines therebetween, each daisy chain comprising at least a first slave unit connected by one of the physical interface lines to the first master unit and a last slave unit connected by another of the physical interface lines to the second master unit,
wherein in normal operation, downstream data packets received from the network are passed from the first master unit to each of the daisy chains via the first slave unit in each chain, and upstream data packets received by the slaves in each chain from the subscriber lines are passed via the first slave unit in the chain to the first master unit for transmission over the network.

Ex. 1001 ('904 Patent) at Claim 4

Patent Owner's First Argues Vink Transmits In The Same Direction

Ex. 1005, 6:16-27. Accordingly, Vink explicitly states that the sequence of data bits supplied to the slaves and the sequence of data bits received from the slaves *both correspond to the sequence of the connected slaves*. Ex. 2005, ¶84. Based on this disclosure, the sequence of transmission from the master to the slaves and the sequence of transmission from the slaves to the master must be identical—that is, the slaves must transmit and receive data to the masters in the same order as that in which they are arranged. Ex. 2005, ¶¶85-86. For this to occur, Vink must transmit data from the master to the slaves and receive data from the slaves to the master in the same direction (i.e., clockwise or counterclockwise, but not clockwise and counterclockwise depending on whether the data is upstream or downstream). *Id.*

POR at 49

A further embodiment of the method according to the invention, under the control of the at least one master, comprises the steps of:

- supplying the data bits for the I/O modules to the slaves via the transmission system, the sequence of the data bits also corresponding to the sequence of the connected slaves;
- receiving from the slaves via the transmission system, the data bits originating from the I/O modules, the sequence of the data bits received also corresponding to the sequence of the connected slaves;

POR at 48-49; Ex. 1005 (Vink) at 6:16-27

Vink Teaches Transmitting Data In Either Direction

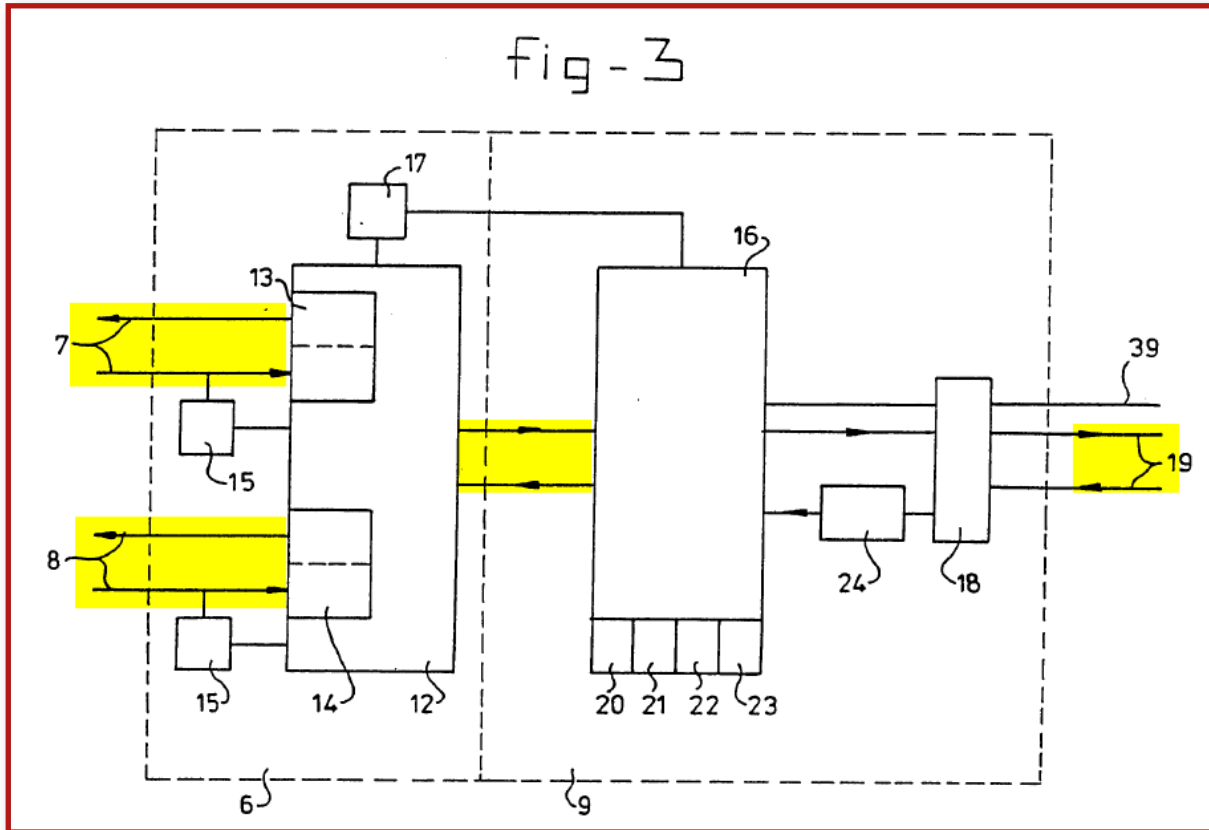
PO is incorrect. Vink teaches transmitting data in either direction. Ex-1005, 26:4-7 (“[T]he at least one master (1) and the slaves (2, 3, 4, 5) are arranged to transmit or receive data bits via a transmission ring (7, 8) *in one and/or the other direction.*”); Figures 3-4. That is, the data sequentially supplied to the slaves can be in an ascending order (*e.g.*, slave 1→2→3→4) or sequentially received by the slaves in a descending order (*e.g.*, slave 4→3→2→1).

Reply at 19

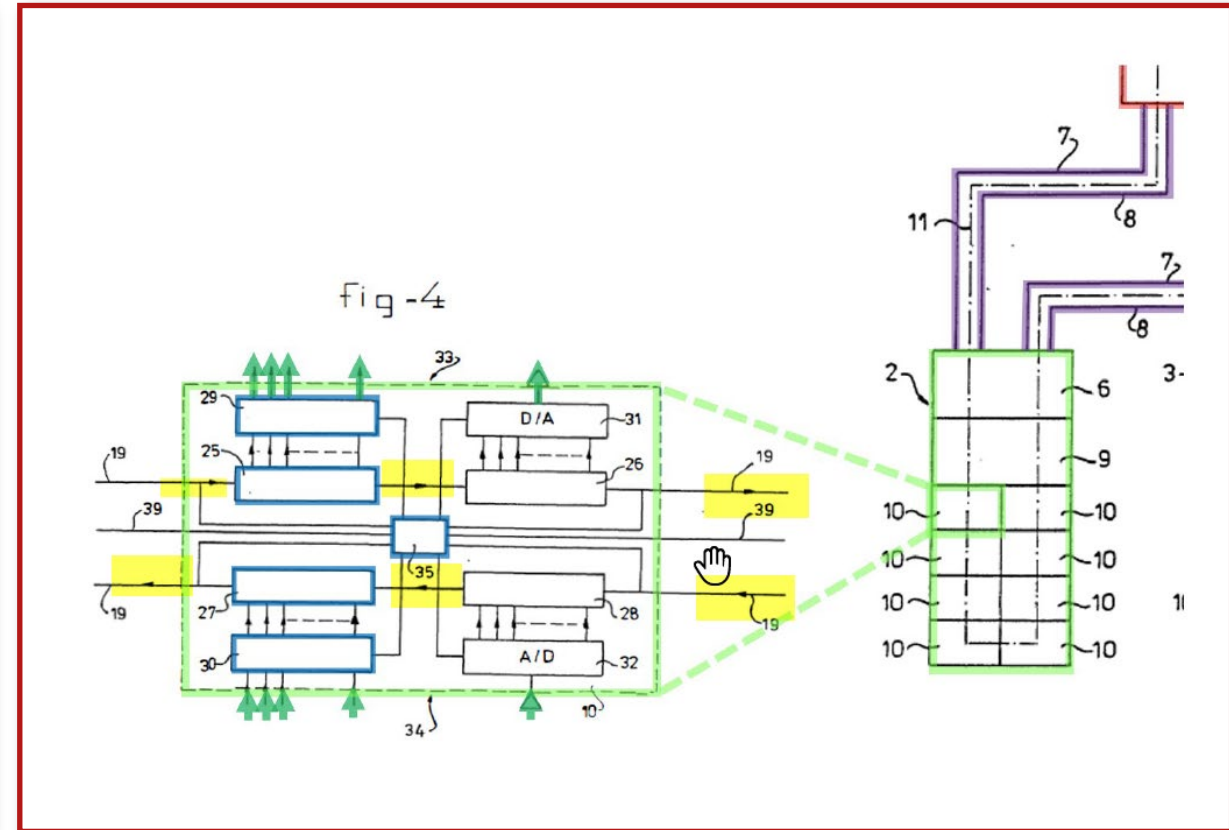
A very flexible system is obtained in an embodiment of the invention in that the at least one master and slaves are designed to transmit or receive packets of data bits via a transmission system ring **in one and/or the other direction.** Master and/or slaves

Petition at 42-43; Ex. 1005 (Vink) at 14:28-31

Vink Teaches Transmitting Data In Either Direction



Reply at 19; Ex. 1005 (Vink) at Fig. 3



Petition at 42; Reply at 19; Ex. 1005 (Vink) at Fig. 4

Petition Relied On The Combination of Vink And Patrick

It would have been obvious to combine the teachings of Vink with Patrick to provide downstream and upstream data, in which data flows between an external network and into Vink's communication system through the **master/primary station** and the **slaves/secondary stations** that are connected in series in a daisy chain. Given the daisy-chain configuration taught by Vink in which data is transmitted serially, it would have been obvious to send downstream data from an external network to the **active first master** through the **first slave 2** during normal operation. Similarly, given the daisy-chain configuration taught by Vink in which data is serially transmitted, it would have been obvious to send upstream data from one of the slave units into the external network by passing the data through **first slave 2** and into the **master** during normal operation. Sending downstream and upstream data in this manner, in which the master and slaves are connected in serial to transmit data serially, would have been a trivial modification that facilitates transport of data into and out of the network. And a POSITA would have been able to implement such traffic flow of data with a reasonable expectation of success. *See* Ex-1003, ¶¶121-123.

phone networks, to video/movie subscriber service. With the CableComm™ system, digital data may be transmitted both in the downstream direction, from the primary station or controller (connected to a network) to the secondary station of an individual user (subscriber access unit), and in the upstream direction, from the secondary station to the primary station (and to a network). As discussed in greater

Petition at 39; Ex-1006 (Patrick) at 1:34-40

Petition at 43-44

Patent Owner Only Argues Petition Failed To Prove Up Combination

Reply, 19-20. Even if Patrick taught transmitting upstream and downstream data in different directions, Petitioner has not shown that a POSA would adapt Patrick's teaching to Vink's specific topology having two master units. A POSA would understand that Vink's address system is unidirectional, and the same address would correspond to two different slaves depending on which direction the data is transmitted in. Adapting Patrick to Vink would cause a conflict in the address of each slave.

Sur-Reply at 16-17

Disputed Issue #4

Claim 9: “Switch” and “Pre-Switch”

Claim 9 of the '904 Patent

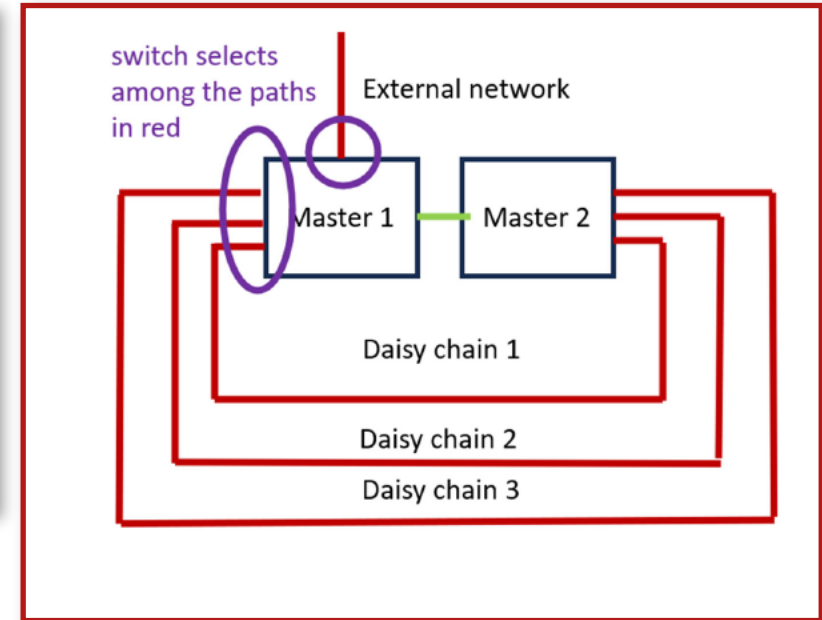
9. Network access apparatus, comprising:
first and second master units, each comprising a physical interface to a packet-switched network;
a plurality of slave units, each slave unit comprising one or more ports to respective subscriber lines; and
a plurality of physical interface lines, which link the slave units in one or more daisy chains, in which the slave units are mutually connected in series by the physical interface lines therebetween, each daisy chain comprising at least a first slave unit connected by one of the physical interface lines to the first master unit and a last slave unit connected by another of the physical interface lines to the second master unit,
wherein each of the first and second master units comprises:
a switch, configured to route data packets between the respective physical interface and the one or more daisy chains; and
a pre-switch, which in the event of a fault at a location in one of the daisy chains, re-routes at least a portion of the data packets exchanged with one or more of the slaves in the daisy chain in which the fault has occurred through another one of the daisy chains.

Ex. 1001 ('904 Patent) at Claim 9

POR Argues Claim Requires Switching To One Of “Several” Daisy Chains

Claim 9 requires “a switch[] configured to route data packets between the respective physical interface and the one or more daisy chains.” Accordingly, claim 9 requires a switch that selects between either the external network or one of potentially several daisy chains to route data packets, as shown in the following diagram:

POR at 50



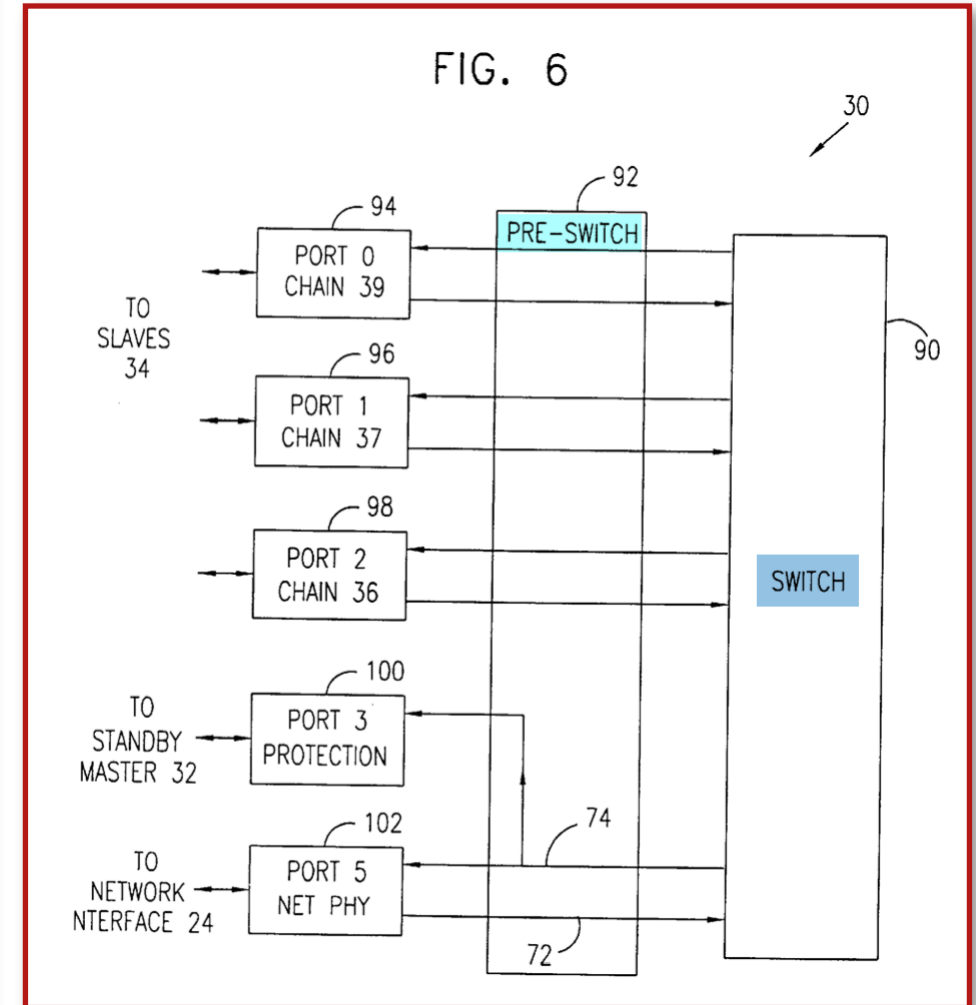
POR at 51

a switch, configured to route data packets between the respective physical interface and the one or more daisy chains; and

Ex. 1001 ('904 Patent) at Claim 9

Sur-Reply Now Argues Claim Requires *The Switch* To Switch Between Upstream and Downstream Data Packets

FIG. 6 is a block diagram that schematically shows details of active master 30 in normal operation, in accordance with a preferred embodiment of the present invention. Master 30 comprises a main switch 90 and a pre-switch 92. The main switch receives downstream (incoming) packets from the network physical layer interface (NET PHY). The network interface has a switching address 102, corresponding to a switch port no. 5. (For the particular case of ATM switching, this and the other port numbers in the figure preferably correspond to UTOPIA addresses.) The packets are distributed to chains 36, 37 and 39 at respective addresses 98, 96 and 94 (switch ports 2, 1 and 0). Upstream packets are delivered to address 102 for transmission over the network. Pre-switch 92 bcasts these packets, as described hereinabove, to an address 100 (switch port 3) of protection interface 76 to standby master 32. Input packets to master 30 from the protection interface are discarded by pre-switch 92. Other than these protection functions, the pre-switch operates as a transparent pass-through, as shown in FIG. 6, as long as no faults have occurred in system 31.



Sur-Reply at 18; Ex. 1001 ('904 Patent) at FIG. 6

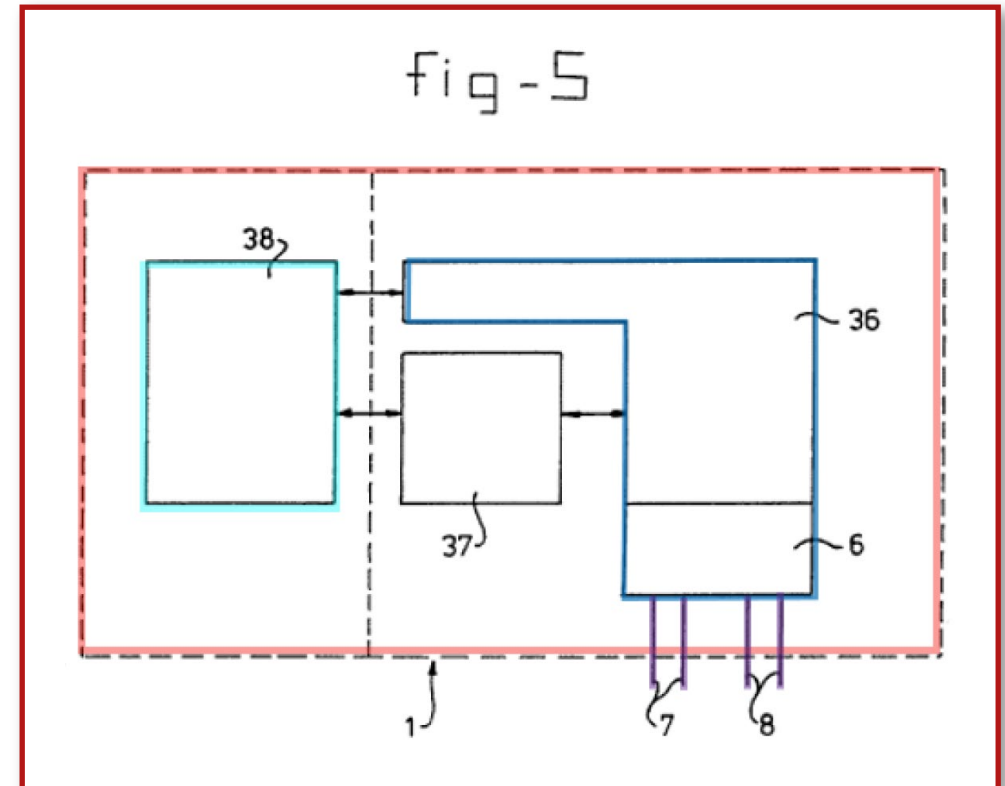
Petition Properly Identified The Requisite Functionality Of The Switch

The control unit 36 and transmitting/receiving unit 6 are “configured to route data packets between the respective physical interface and the one or more daisy chains.” For example, Vink explains that the control unit 36 “extract[s]” information about the particular slave located along the daisy chain the data packets should be sent to and controls the data flow via the transmission lines 7, 8. See Ex-1005, 21:3-9 (“[T]he control computer 38 provides for and monitors the correct sequence of the data bits for a relevant slave... . The information about this sequence is extracted by the control unit 36 from the status information received from the relevant slaves.”); *id.*, 20:33-34 (“[A] control unit 36 for controlling the data flow via the transmission system 7, 8,”). Moreover, the “transmitting/receiving unit 6 provides for the monitoring of the transmission” and “the transmitting/receiving unit 6 also provides for the switching of the transmission ring or of the communication direction of the data flow.” Ex-1005, 21:3-14. See Ex-1003, ¶¶128-130.

wherein each of the first and second master units comprises:

a switch, configured to route data packets between the respective physical interface and the one or more daisy chains; and

Ex. 1001 ('904 Patent) at Claim 9



Petition at 46-48

Claim 9 of the '904 Patent

9. Network access apparatus, comprising:
first and second master units, each comprising a physical interface to a packet-switched network;
a plurality of slave units, each slave unit comprising one or more ports to respective subscriber lines; and
a plurality of physical interface lines, which link the slave units in one or more daisy chains, in which the slave units are mutually connected in series by the physical interface lines therebetween, each daisy chain comprising at least a first slave unit connected by one of the physical interface lines to the first master unit and a last slave unit connected by another of the physical interface lines to the second master unit,
wherein each of the first and second master units comprises:
a switch, configured to route data packets between the respective physical interface and the one or more daisy chains; and
a pre-switch, which in the event of a fault at a location in one of the daisy chains, re-routes at least a portion of the data packets exchanged with one or more of the slaves in the daisy chain in which the fault has occurred through another one of the daisy chains.

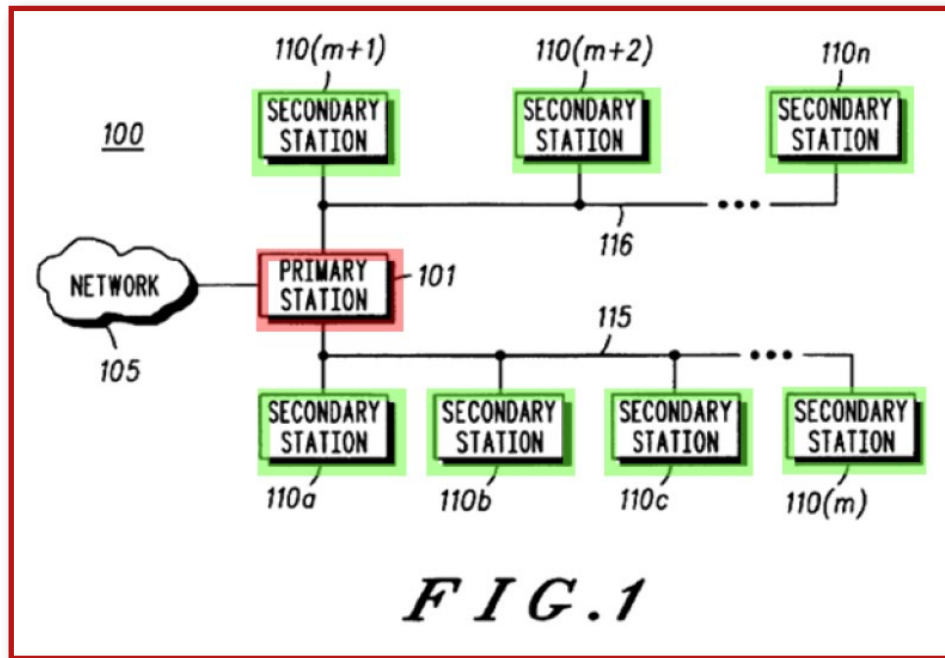
Ex. 1001 ('904 Patent) at Claim 9

POR Argues Based On Vink Alone

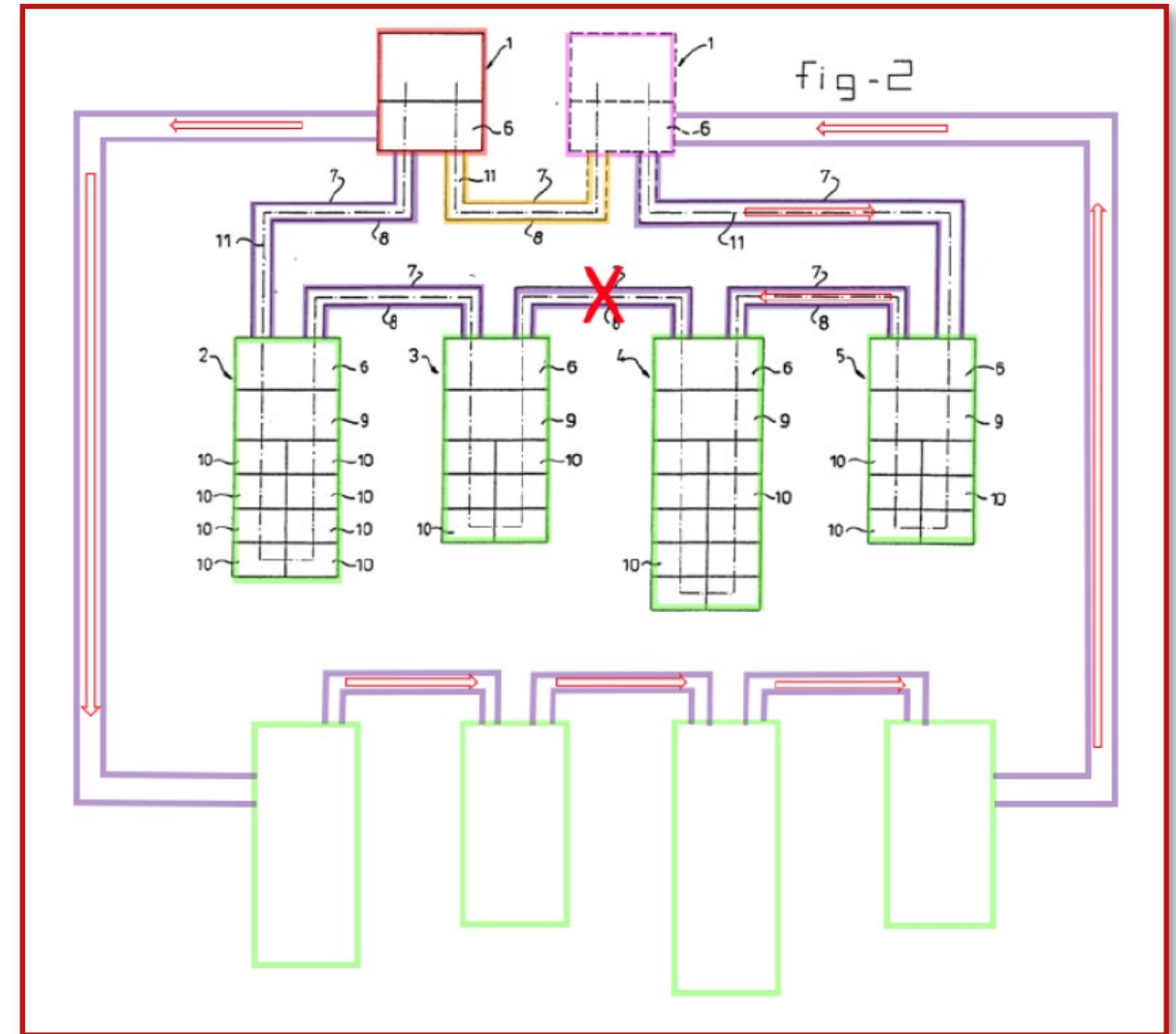
The Petition presents no evidence that Vink routes data through one of several daisy chains, besides conjecture that it could do so because it teaches configurations with “more than two rings.” Paper 2, 50. But even with two rings and the modifications

POR at 54

The Petition Relied On The Teachings Of Vink And Patrick



Petition at 51; Ex. 1006 (Patrick) at Fig. 1



Petition at 53; Ex. 1005 (Vink) at Fig. 2 (modified)

Sur-Reply Now Argues No Reason To Modify Vink Because Vink Alone Already Provides A Solution For Faults

through its rings by reversing the direction of data flow. There is no rationale for or need to reroute the data flow through another daisy chain when Vink alone already provides a solution for faults. *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1369 (Fed. Cir. 2012) (“Because each device independently operates effectively, a person having ordinary skill in the art, who was merely seeking to create a better device to drain fluids from a wound, would have no reason to combine the features of both devices into a single device.”).

Sur-Reply at 19-20

Proper To Consider POSITA's Creativity: Modification Merely Provides One Alternate Data Flow Path

Indeed, it is well-settled law that a POSITA “is also a person of ordinary creativity, not an automaton.” *KSR*, 550 U.S., 421. A POSITA would have been able to readily figure out this alternate data flow path because it is merely one of two options to get data to **slave 4** when the transmission path between **slaves 3** and **4** was broken. It is proper to consider “the inferences and creative steps that a person of ordinary skill in the art would employ.” *Id.*, 418. The POR does not

Reply at 24; see also Petition at 51-55

Disputed Issue #5

Claims 6 And 23: “Bicasting”

Claims 6 and 23 of the '904 Patent

6. Apparatus according to claim 5, wherein the first master unit **bicasts** the upstream data packets that it receives from the slave units to the network and, via the protection interface, to the second master unit, which transmits the upstream data packets to the network.

Ex. 1001 ('904 Patent) at Claim 6

23. A method according to claim 22, and comprising **bicasting** the upstream data packets from the first master unit to the network and to the second master unit, which transmits the bicast upstream data packets over the network.

Ex. 1001 ('904 Patent) at Claim 23

Patent Owner Misinterprets The Petition's Mappings For Claims 6 And 23

The Petition Did Not Remove “Bi” In The “Bicasts”/“Bicasting” Limitations Of Claims 6 And 23

Indeed, the Petition admits as much by deliberately erasing the word “bicasts” from the claims: “Vink further suggests that ‘the first master unit []casts the upstream data packets that it receives from the slave units, via the protection interface, to the second master unit.’” Paper 2, 70. Removing this limitation, the Petition at most alleges that Vink’s masters may transmit upstream packets to the network (a POSA would not be able to modify Vink’s masters to do so for the reasons discussed above) or transmit upstream packets to a second master for transmission to a network. Critically, the Petition has not alleged or shown that a

POR at 56-57

The Petition *First* Discussed The “Casts”/“Casting” Portion

b) [6a] wherein the **first master unit** bicast the upstream data packets that it receives from the **slave units** to the network and, via the **protection interface**, to the **second master unit**, which transmits the upstream data packets to the network.

As explained in Section VI.B.1.f [4d], Vink with Patrick suggests sending
“upstream data packets that it receives from the slave units to the network.”

Reply at 25; Petition at 70

operation. Similarly, given the daisy-chain configuration taught by Vink in which data is serially transmitted, it would have been obvious to send upstream data from one of the slave units into the external network by passing the data through **first slave 2** and into the **master** during normal operation. Sending downstream and

Reply at 25; Petition at 44

The Petition *Then* Discussed The “Bi” Portion Of “Bicasts”/“Bicasting”

b) [6a] wherein the **first master unit** bcasts the upstream data packets that it receives from the **slave units** to the network and, via the **protection interface**, to the **second master unit**, which transmits the upstream data packets to the network.

As explained in Section VI.B.1.f [4d], Vink with Patrick suggests sending “upstream data packets that it receives from the slave units to the network.”

As explained in Section VI.B.2.b [5a], Vink further suggests that “the first master unit []casts the upstream data packets that it receives from the slave units, via the protection interface, to the second master unit.”

Finally, Vink with Patrick suggests that the **passive master** transmits the upstream data packets to the network because “[a]ll the masters are so designed

Reply at 25; Petition at 70

The Petition *Then* Discussed The “Bi” Portion Of “Bicasts”/“Bicasting”

this limitation. The '904 patent states that “[t]he active master bicasts these packets, sending them both to network 22 and to standby master 32 over a protection interface 76 between the two masters, as indicated by an arrow 77. The standby master also transmits the upstream packets over network 22, as indicated by an arrow 78.” Ex-1001, 8:42-49. The '904 patent admits that this is a well-known feature that is commonly used in fault protection mechanisms. *See id.*, 8:49-52 (“This redundancy in transmission is in accordance with fault protection mechanisms used in high-speed networks known in the art, such as the standard ‘1+1 APS’ (automatic protection switching) technique used in SONET.”); *see also* Ex-1009, 52-55. A POSITA would have been motivated to implement such 1+1 APS fault protection mechanism between the two masters and between the two masters and the network in case one of the links between the masters or the links from the masters to the network fails. Combining such well-known fault

Reply at 25; Petition at 69

Sur-Reply Argues 1+1 APS Does Not “Indirectly [Cast] To The Network Via the Second Master Unit”

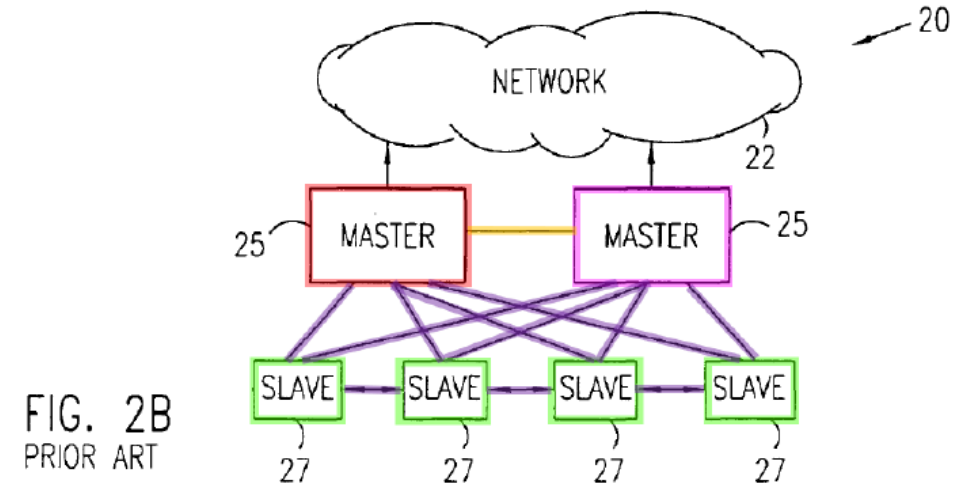
Claims 6 and 23 require the first master unit “bicast” the upstream data packets received from the first slave unit directly to the network and indirectly to the network via the second master unit.

PO’s expert Mr. Gomez however explained that “1+1 APS” refers to a general technique of providing two copies of the same transmission. Ex2025, ¶¶103-106. “1+1 APS” does not necessarily require multicasting where a first master transmits packets both to a network and to a second master for transmission to the network. *Id.*

Sur-Reply at 20-23

AAPA's 1+1 APS Technique Provides That Both The Active And Standby Masters Will Transmit The Same Upstream Packets To The Network

master 30. The active master bicast these packets, sending them both to network 22 and to standby master 32 over a protection interface 76 between the two masters, as indicated by an arrow 77. The standby master also transmits the upstream packets over network 22, as indicated by an arrow 78. This redundancy in transmission is in accordance with fault protection mechanisms used in high-speed networks known in the art, such as the standard “1+1 APS” (automatic protection switching) technique used in SONET.



Petition at 69; Reply at 26-27; Ex. 1001 ('904 Patent) at 8:44-52, FIG. 2B

The Petition Proposed Modifying Vink To Implement The 1+1 APS Technique

Ex-1009, 52-55. A POSITA would have been motivated to implement such 1+1 APS fault protection mechanism between the two masters and between the two masters and the network in case one of the links between the masters or the links from the masters to the network fails. Combining such well-known fault protection mechanism in Vink's communication system, which already has two master stations that has a communication path therebetween, and as modified with Patrick/AAPA, which connects the master units to a network, would have been a trivial modification that a POSITA would have been motivated to do as well as able to readily implement with a reasonable expectation of success. *See Ex-1003,*

Disputed Issue #6

Claim 20: “Initial” And “Further Downstream Data”

No longer contested in Sur-Reply

Claims 20 of the '904 Patent

19. A method for providing access to a network, comprising:

coupling first and second master units to interface with the network;

linking a plurality of slave units, each slave unit comprising one or more ports to respective subscriber lines, in a daisy chain between the first and second master units;

conveying **initial downstream data packets**, received from the network by one of the master units, along the daisy chain in **a first direction**, so as to deliver the packets to the ports of the slave units; and

in the event of a fault in the daisy chain, conveying **further downstream data packets**, received from the network by one of the master units, along the daisy chain in **a second direction**, opposite to the first direction, so as to deliver the further packets to the ports of at least some of the slave units.

20. A method according to claim 19, wherein the **initial** and **further** downstream packets are received from the network by the first master unit, and wherein conveying the **further downstream** packets **in the second direction** comprises conveying the further downstream packets from the first master unit to the second master unit, and then conveying the further downstream packets from the second master unit to the daisy chain.

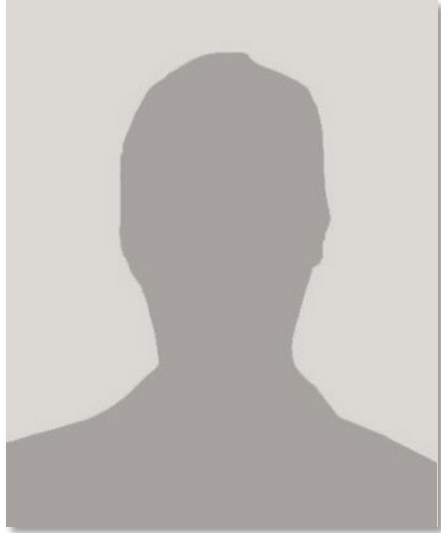
Ex. 1001 ('904 Patent) at Claim 20

Patent Owner Mischaracterizes Claim 20

Similarly, claim 20 claim a redundant process in which *the same* downstream data is conveyed to the same slave *twice*—once directly by the first master unit and once indirectly by the first master unit by way of the second master unit. This is required by the dependency of claim 20 from claim 19—claim 19 requires the master to convey downstream packets “along the daisy chain in a first direction” and claim 20 then requires that master to convey downstream packets “in the second direction” by conveying the packets to a second master unit which conveys the packets to the slaves in the daisy chain. Ex. 2005, ¶98.

POR at 56

Patent Owner's Expert Admitted That The "Initial Download Data" And The "Further Download Data" Are Received Only Once

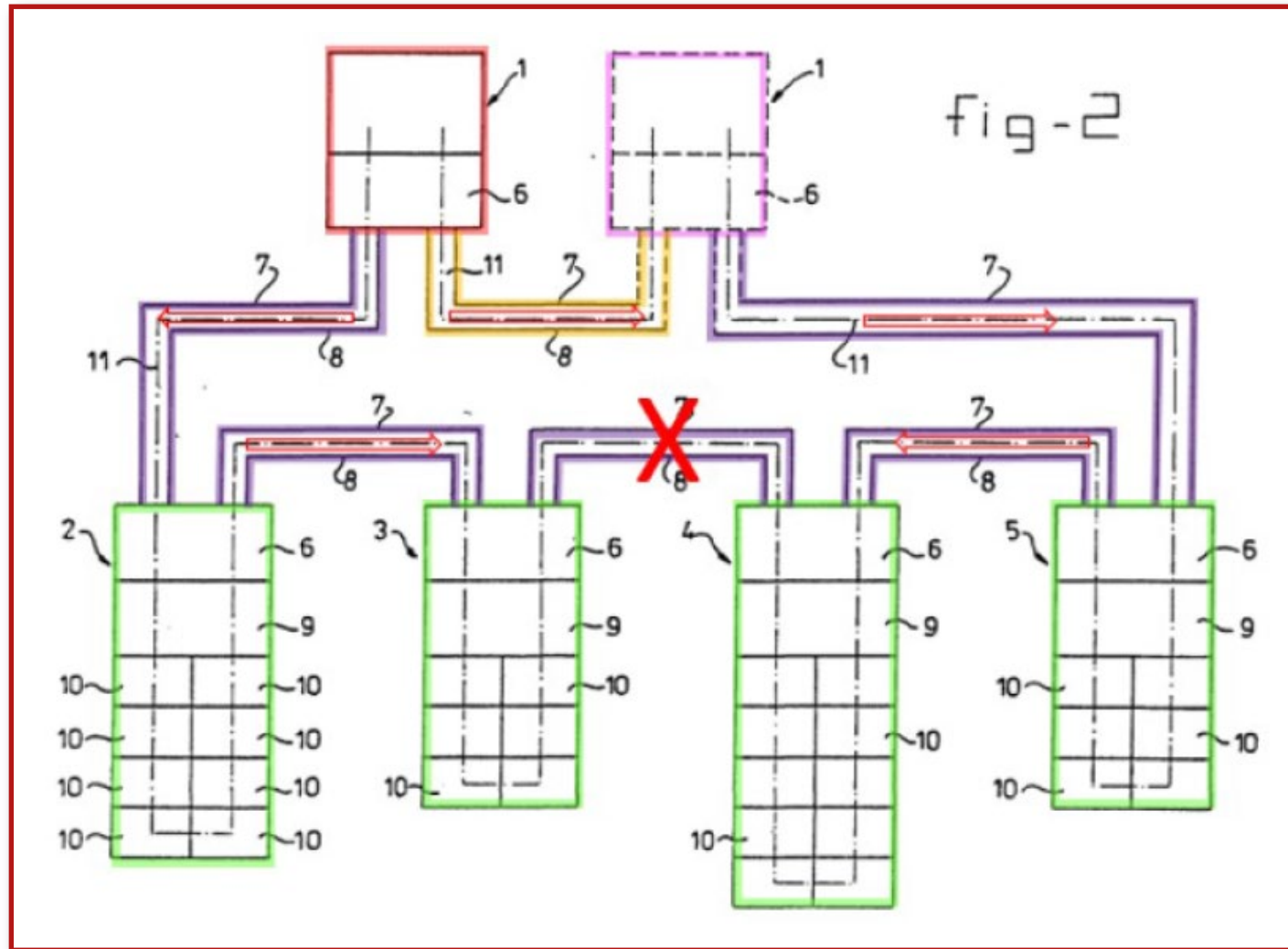


Miguel Gomez
PO's Expert

- Q. ...The initial downstream data packets will be conveyed ***to the slaves only once; correct?***
- A. Well, packets -- data can be retransmitted. But if you're looking at just those instances, those very specific packets, and excluding any retransmissions, ***they get sent once.***
- Q. And excluding any retransmissions, ***the further downstream packets of Claim 20 are also conveyed to the slaves in the second direction only once; right?***
- A. So the Claim 20 requires that the packets received from the first downstream unit -- by the first downstream unit are conveyed to the second master unit. And that could be construed as a transmission. And then from the second master unit to the slave units, ***they are only sent once to the slave*** but *they are sent through the second master.*
- Q. ...Neither Claim 19 nor Claim 20 discuss retransmissions; correct?
- A. That's not -- that's not here.

Ex. 1013 at 174:21-175:19; Reply at 29-30

The Petition Applied The Proper Interpretation Of Claim 20



Reply at 30-31; Petition at 68

Disputed Issue #7

Claim 8: First Master Unit Already Received Downstream Data

No longer contested in Sur-Reply

Patent Owner Mischaracterizes Claim 8

8. Apparatus according to claim 7, wherein the downstream packets for the slave units in the portion of the daisy chain between the location of the fault and the second master unit are conveyed to the second master unit from the first master unit via another one of the daisy chains.

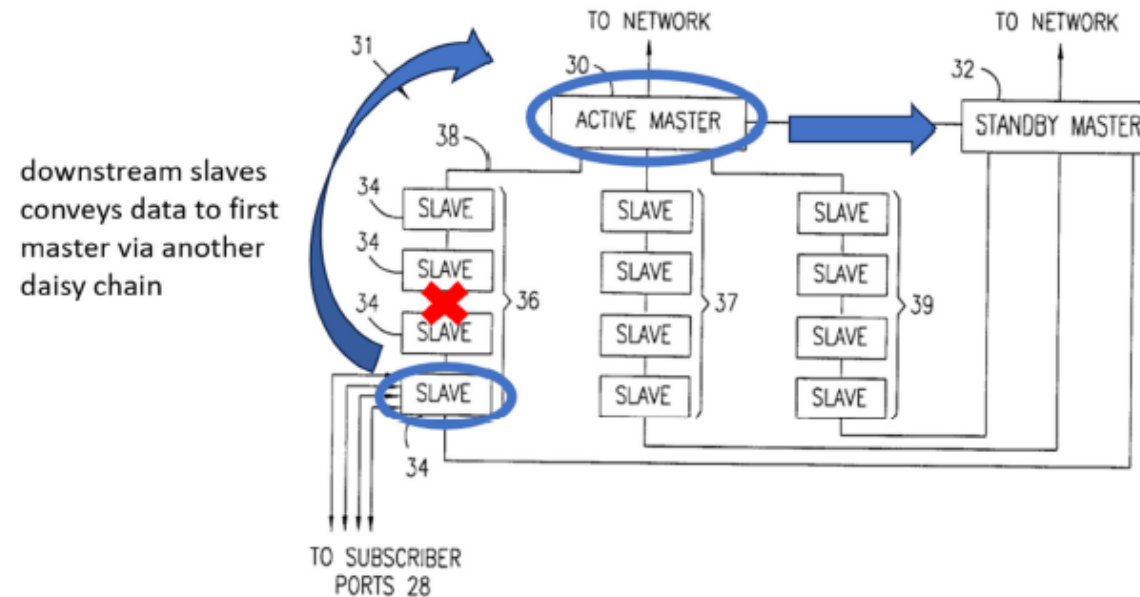
Ex. 1001 ('904 Patent) at Claim 8

packets via another daisy chain. Moreover, claim 8 specifies that packets from *a slave unit between the fault and the second master unit* are conveyed to the second master unit from the first master via another daisy chain. Thus, claim 8 requires more than simply routing data from a master to a slave through another daisy chain in the event of a fault—claim 8 requires the slave's downstream packets reach the first master via another daisy chain, and the first master to then pass the downstream packets to the second master:

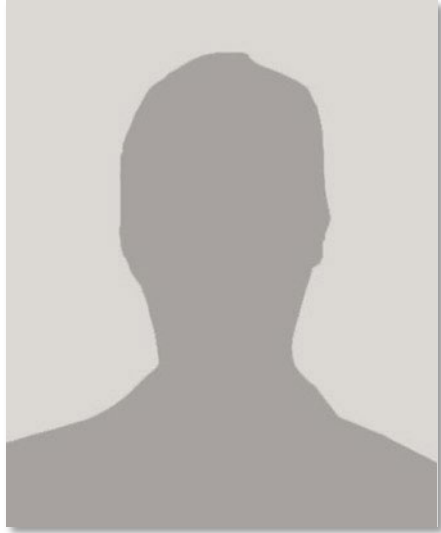
POR at 59-60

Patent Owner Mischaracterizes Claim 8

via another one of the daisy chains.” Thus, claim 8 explicitly states that the slave’s downstream packets reach the first master *via another daisy chain*, and the first master to then pass the downstream packets to the second master. The flow of packets according to claim 8 is shown by the following annotations to Fig. 3



Ex. 2025 (Gomez Decl.) at ¶108



Miguel Gomez
PO's Expert

- Q. So the sentence [in paragraph 108] that starts, "Thus, Claim 8 explicitly states that ***the slave's downstream packets reach the first master via another daisy chain***" is inconsistent with the language of Claim 8; correct?
- A. ***There appears to be an error here that I need to correct.***

Reply at 32; Ex. 1013 (Gomez Dep. Tr.) at 185:16-22

Disputed Issue #8

Claim 17: “Multicast Packet”

Patent Owner Argues Multicast Limitation Was Not Discussed

The Petition simply does not address claim 17's recital of a multi-cast packet or identify where in Vink a packet is disclosed as being both retained by the slave and passed to subsequent slaves in the cascade. As such, Petitioner has not met its burden of showing claim 17 to be obvious in view of Vink.

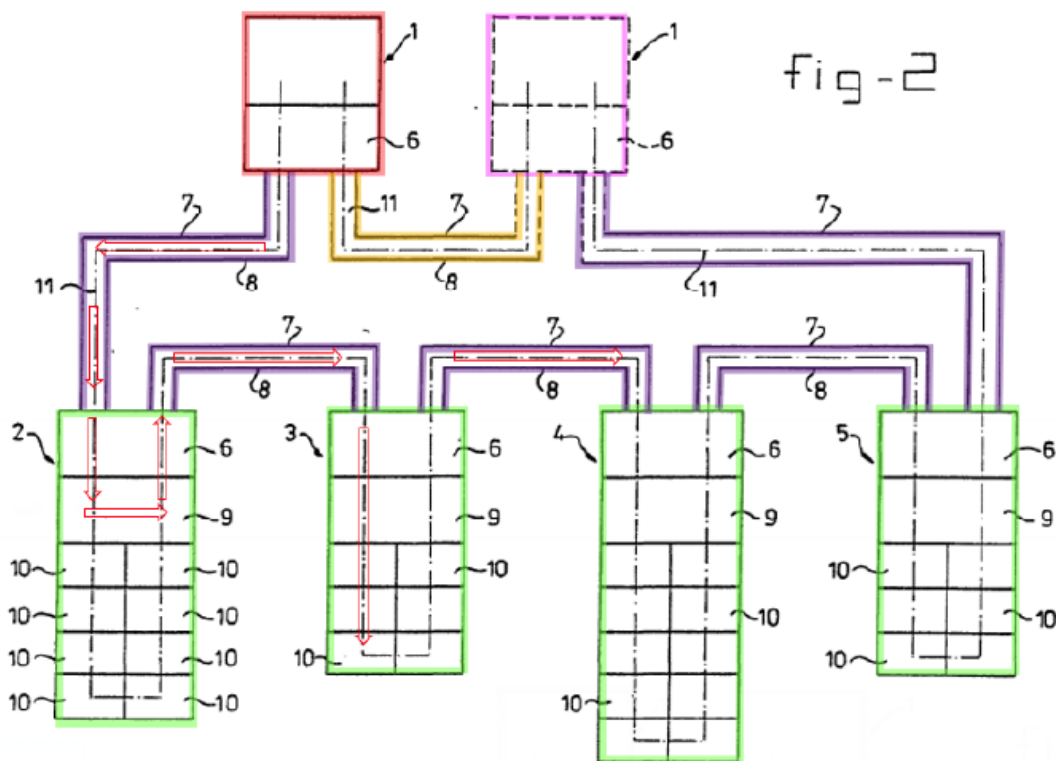
POR at 62

b) [17a] wherein when one of the packets received by the **pre-switch** comprises a multicast packet addressed to one or more of the **ports** on the **slave unit**, the **pre-switch** sorts the multicast packet such that one copy of the packet is retained and another copy of the packet is passed to the **second physical interface**.

As explained in Sections VI.B.1.j [11d], VI.B.1.1 [11f], and VI.B.9.d [14c], Vink discloses [17a].

Reply at 32-33; Petition at 89

Petition Provided Ample Explanation



1) [11f] a **pre-switch**, which receives the data packets from one of the **physical interface lines** connected to the **slave unit** and passes those of the data packets that are addressed to any of the **ports** on the **slave unit** to the switch fabric, while passing packets not addressed to any of the **ports** on the **slave unit** for output through another of the **physical interface lines**.

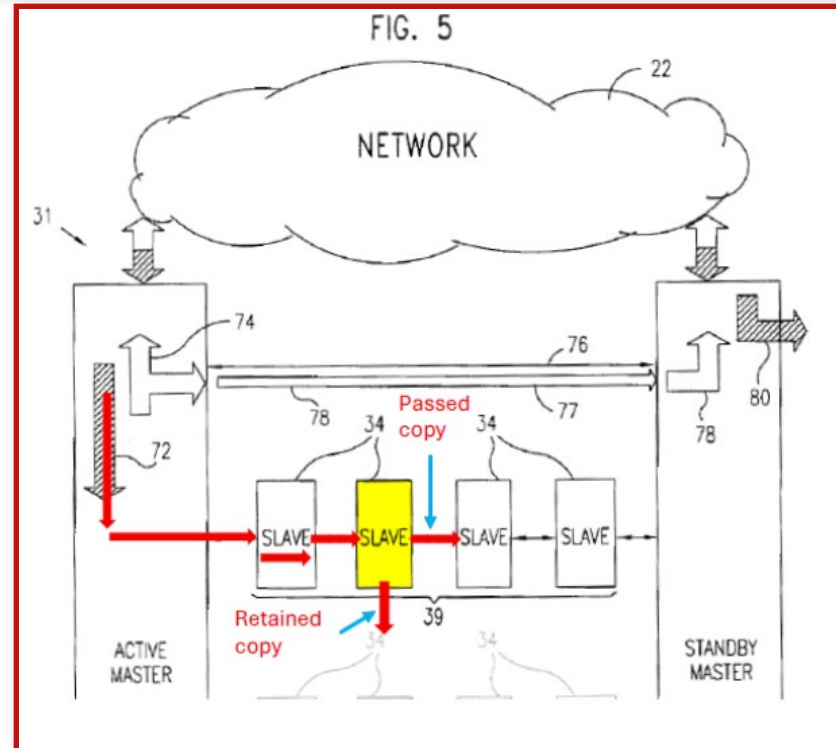
the **transmission lines 7, 8** between **slaves 2 and 3**. The figure below illustrates how data (in red arrows) intended for one of the **I/O modules 10** in **slave 3** passes through **slave 2** through the **transmitting/receiving unit 6** and **control module 9** of **slave 2**, without passing through the **I/O modules 10** of **slave 2**. See Ex-1003, ¶156.

Patent Owner's Expert Confirmed The Illustration In Ex. 1012 Covers Claim 17

Miguel Gomez
PO's Expert

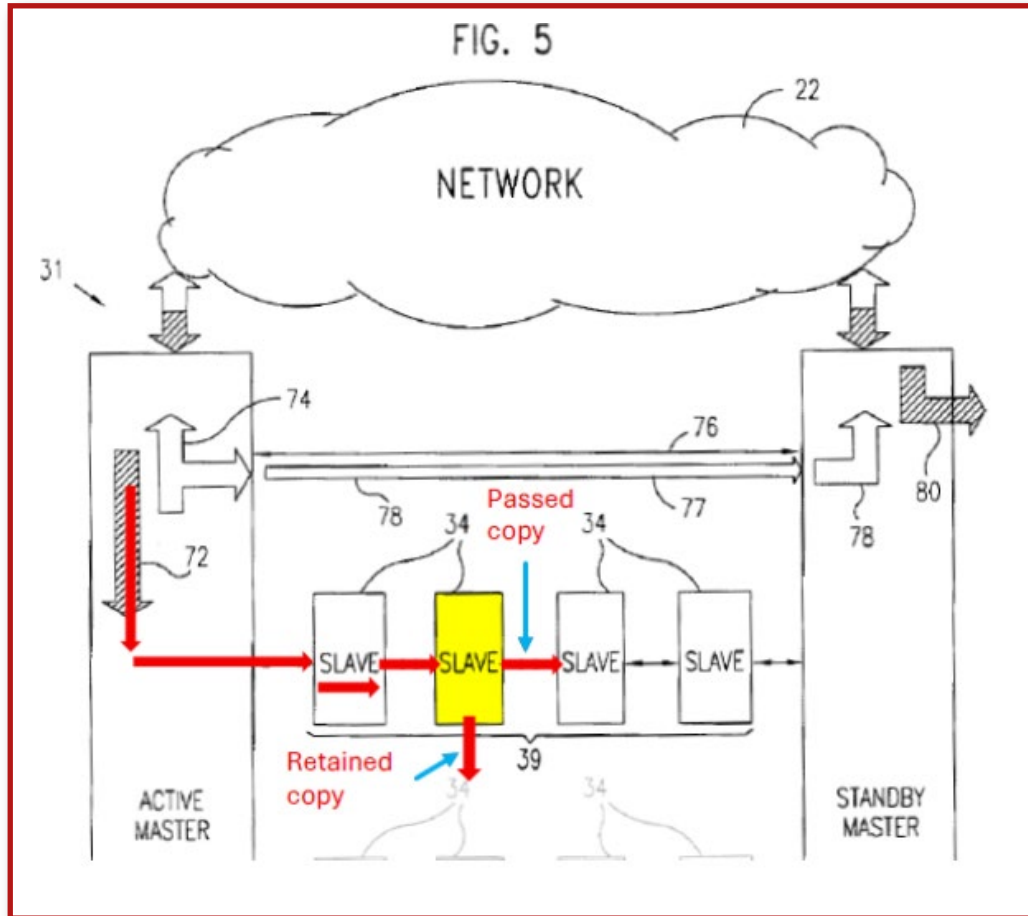
- Q. Is [the illustration of Ex. 1012] consistent with your understanding of a multicast packet according to the '904 patent?
- A. I think that's consistent with the description embodiment that's described in the '904 patent.

Reply at 33-34; Ex. 1013 (Gomez Dep. Tr.) at 153:6-154:1

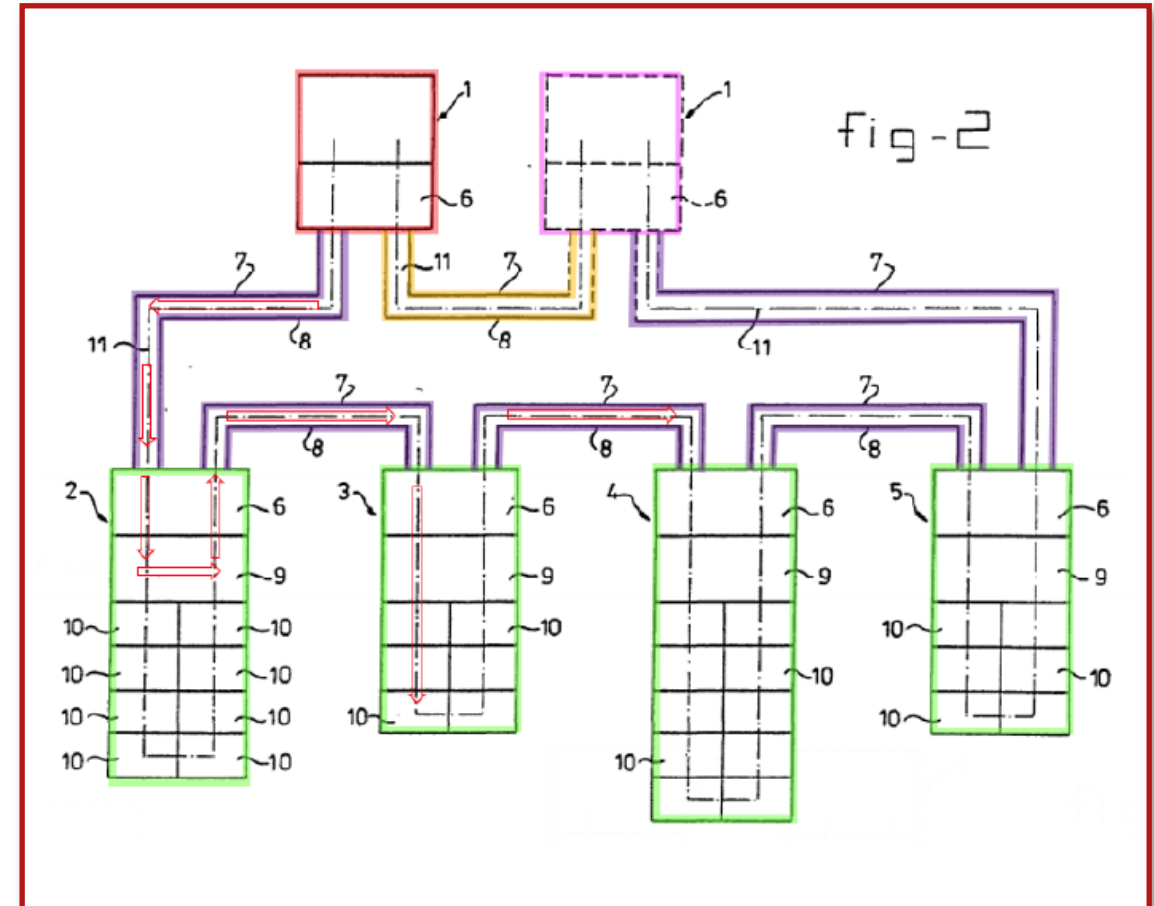


Ex. 1012

The Petition Is Nearly Identical To Ex. 1012



Ex. 1012



Reply 34-35; Petition at 64-65; Ex. 1005 at Fig. 2

Questions?
