

Cisco Systems, Inc.
v.
Orckit Corporation

Patent Owner Demonstratives
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The '904 Patent

1.The '904 Patent

2.Claim Construction

3.The Challenged Claims Are Patentable

The '904 Patent

(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**

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(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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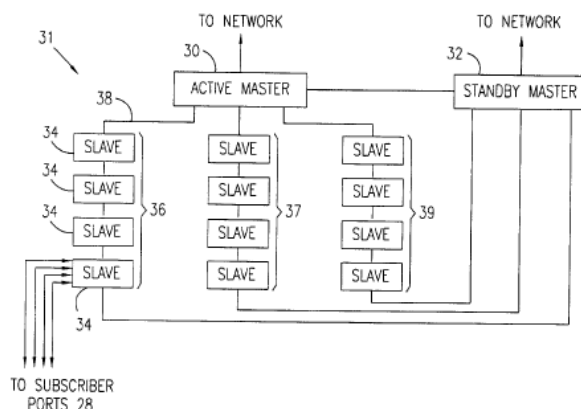
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(57) ABSTRACT

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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(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

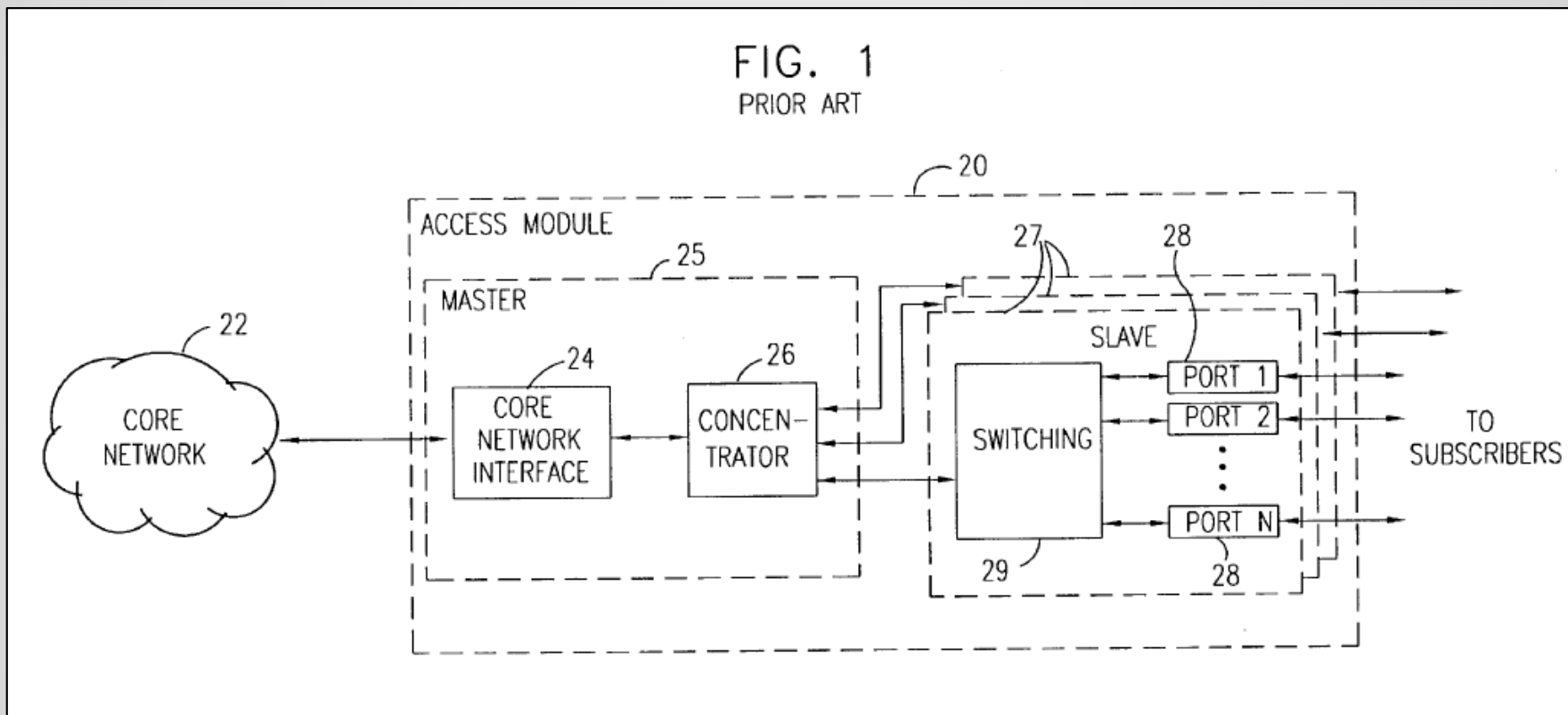
Ex. 1001 ['904 Patent], p. 1

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, Cl. 1.

The '904 Patent



Ex. 1001, Fig. 1

The '904 Patent

FIG. 2A
PRIOR ART

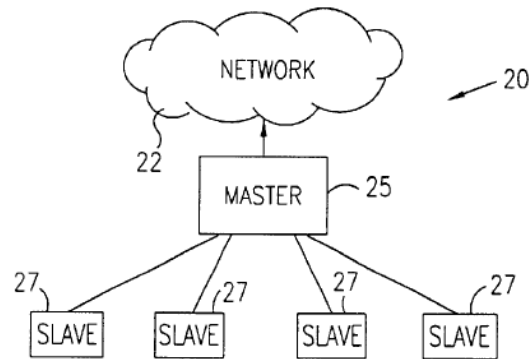
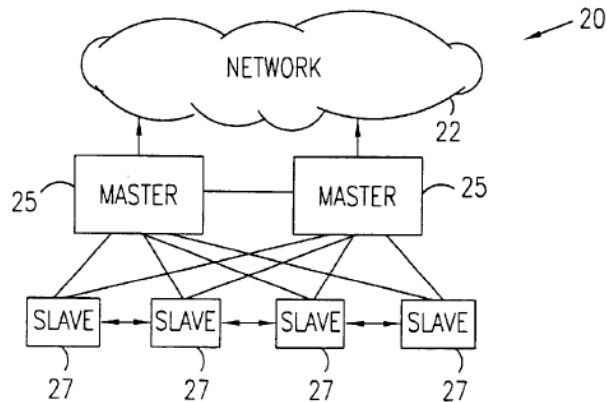
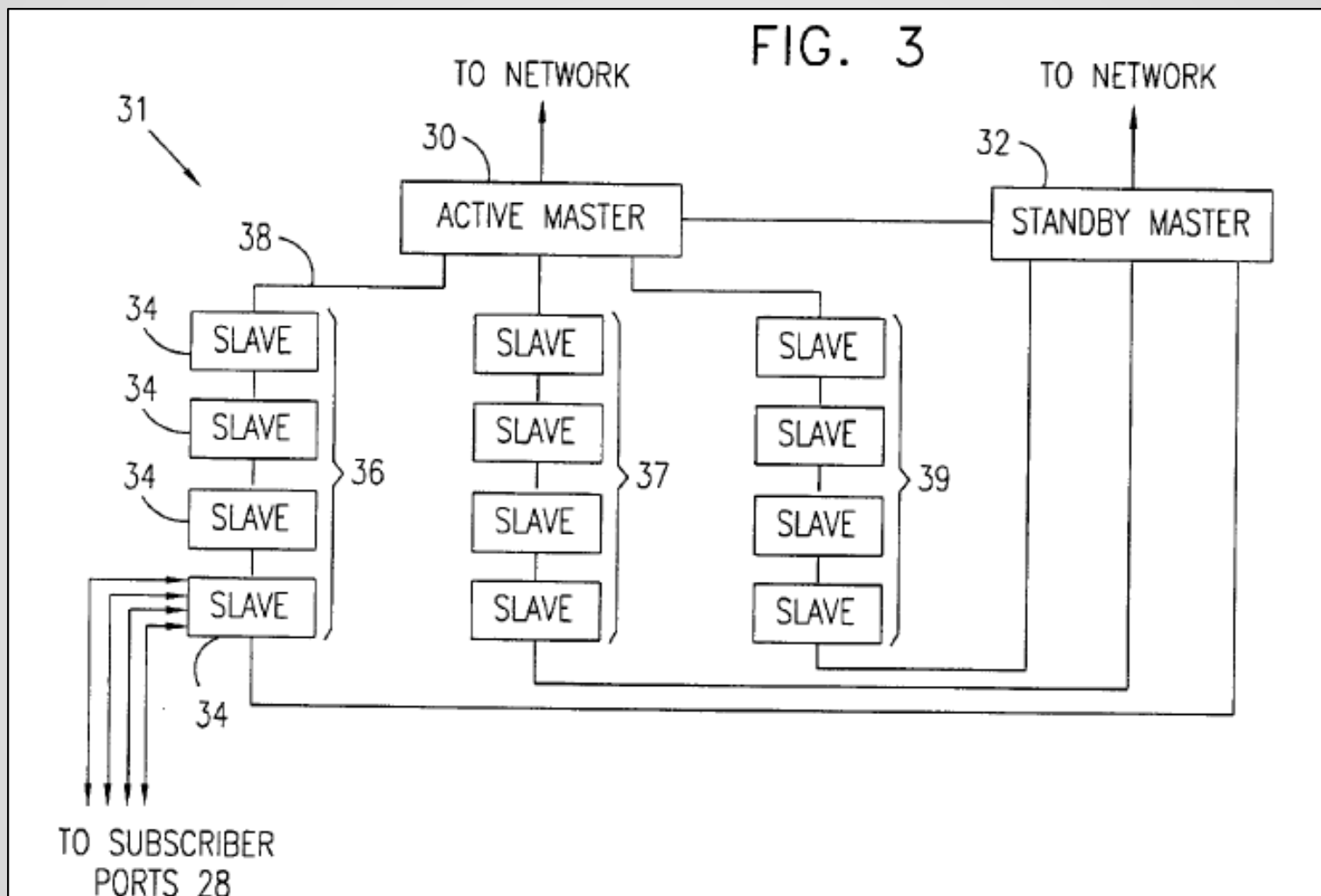


FIG. 2B
PRIOR ART



Ex. 1001, Fig. 2

The '904 Patent



Ex. 1001, Fig. 3

Claim Construction

1.The '904 Patent

2.Claim Construction

- “**subscriber lines**” (“communication lines to users of subscription based services”)

3.The Challenged Claims Are Patentable

Claim Construction

out requiring major investments in new infrastructure. A range of DSL standards have been defined, known generically as “xDSL,” wherein the various standards have different data rates and other associated features but share common principles of operation.

DSL subscribers are connected to high-speed networks through Digital Subscriber Line Access Multiplexer (DSLAM) systems. Because of the high cost of network bandwidth, a single DSLAM must typically be designed to serve between 100 and 1000 subscribers and to concentrate their traffic through one or a few network trunks. The need to serve such a large and potentially variable number of subscribers in the one DSLAM has led to the development of “multi-shelf” access architectures.

POR at 21; Ex. 1001, 1:2-33

Claim Construction

5 In preferred embodiments of the present invention, a multi-shelf access system comprises two master units (“masters”) and a plurality of slave units (“slaves”) One of the masters serves as an active master, through which the slaves normally receive data packets from a core network and transmit packets back upstream to the network. The

10 other master is termed a standby master. The slaves are connected in one or more daisy chains between the active and standby masters, and are configured so that both downstream and upstream packets can be transmitted in either direction along each of the chains, i.e., from or to either of

15 the two masters. Thus, if a failure occurs in any one of the slaves or in a link between them, the traffic direction in the chain in which the failure has occurred is simply reversed so as to run through the standby master. Substantially no reprogramming of the slaves is required for this purpose. All

20 of the slaves (except possibly a slave that has failed) continue to provide service to subscribers, typically with only a short interruption until corrective action is completed.

Preferably, the upstream packets are bicast by the active master to both the core network and to the standby master.

25 The standby master also transmits the upstream packets to the core network, in order to protect against faults in the network interface of the active master unit.

POR at 21; Ex. 1001, 2:4-27

The '904 Patent

1.The '904 Patent

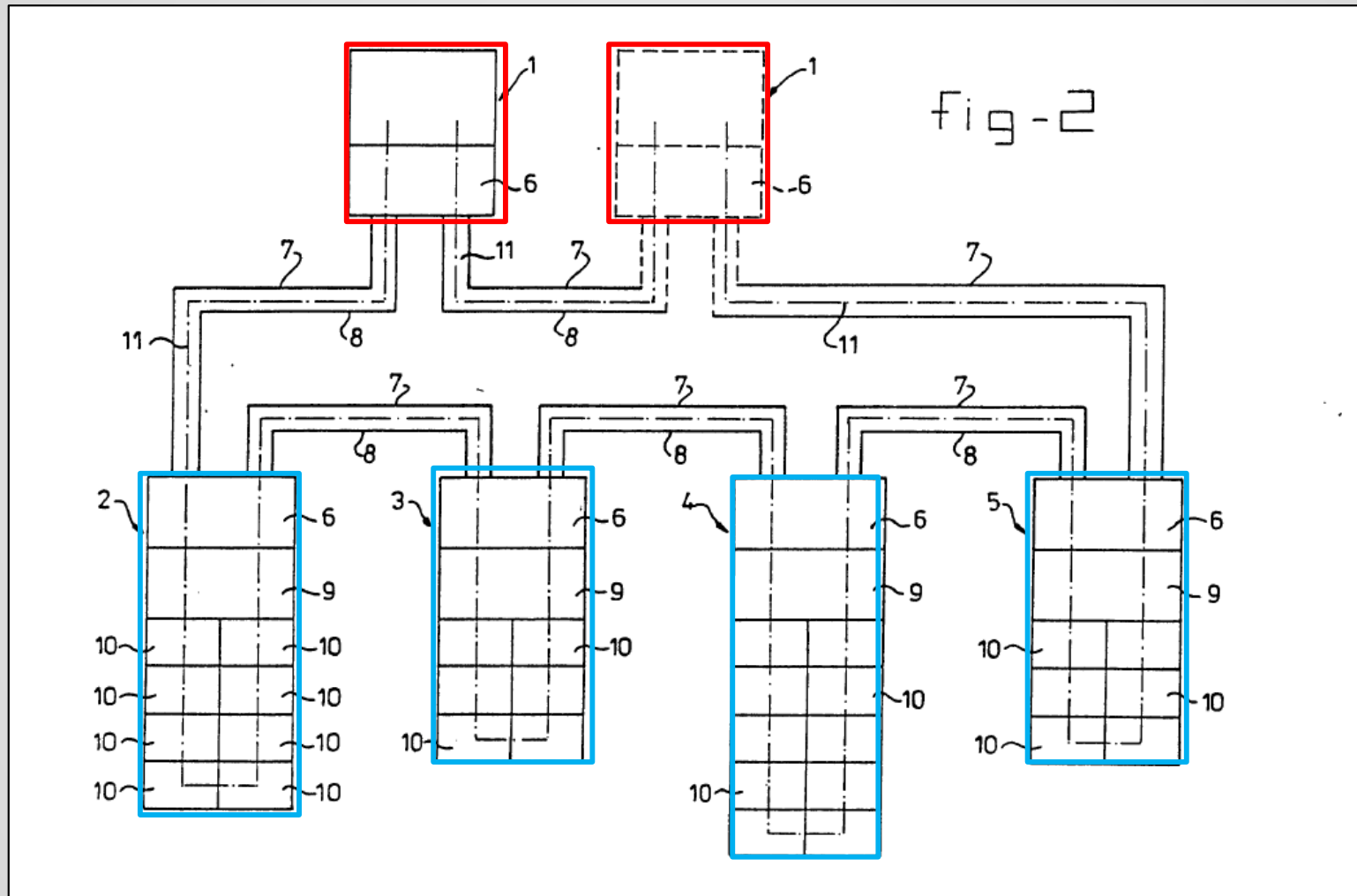
2.Claim Construction

3.The Challenged Claims Are Patentable

The Challenged Claims Are Patentable

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

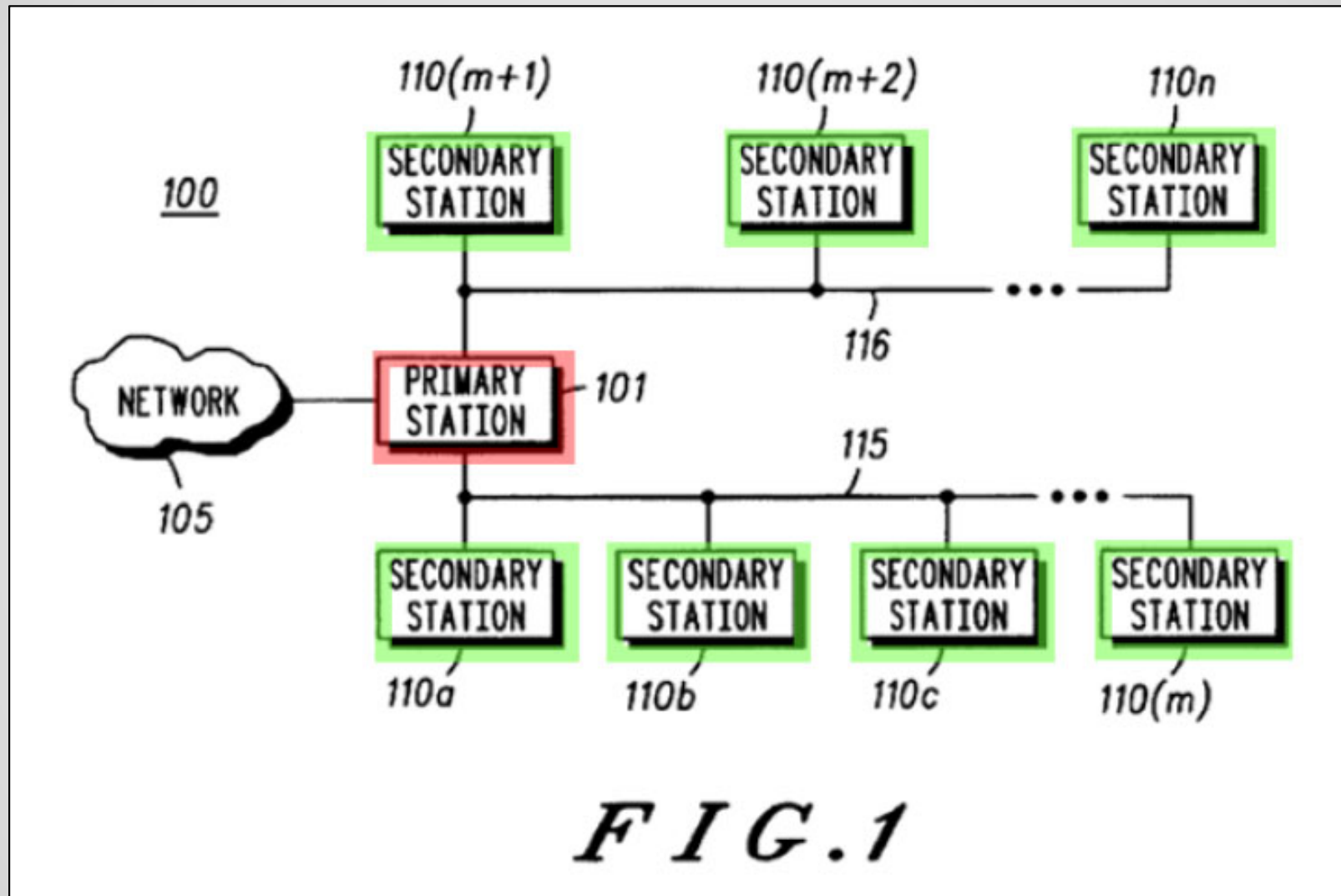
Paper 2, p. 15



Ex 1005, Fig. 2

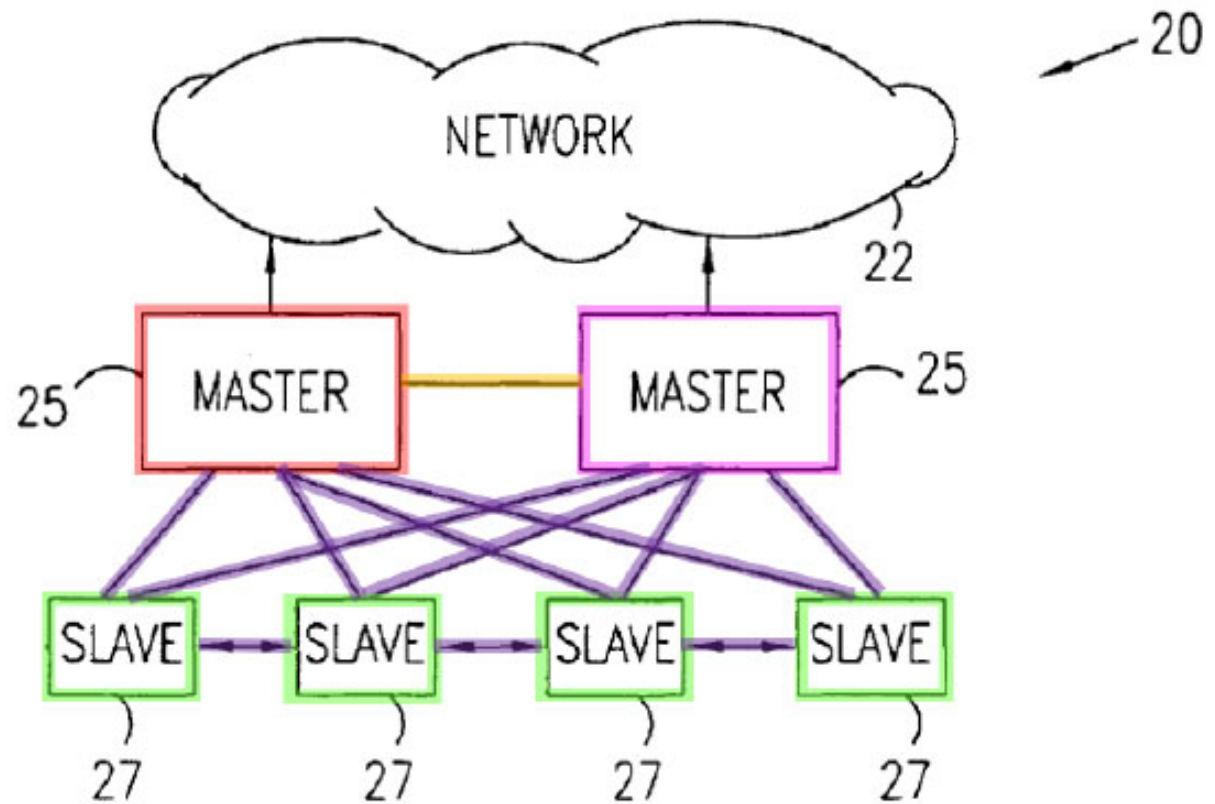
Although *Vink* does not explicitly teach that master 1 accesses a network, master stations connected to networks were well-known.

Sur-Reply at 5; Petition at 20



Pet. at 21; Ex. 1006, Fig. 1

FIG. 2B
PRIOR ART



Ex-1001, Figure 2B.

Pet. at 27; Ex. 1001, Fig. 2B

Vink & Patrick / AAPA

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;

Ex-1001, 1:14-20. Connecting masters to an external network, such as the Internet (as taught by Patrick) using a specific protocol like the ATM or IP (as taught by AAPA) would have had the benefit of enabling downstream (i.e., data flowing from the external network "down" to the communication system) and upstream (i.e., data flowing "up" from the communication system to the external network) 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 would have had a reasonable expectation of success in making such a modification

Pet. at 23

Vink & Patrick / AAPA

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.

Pet. at 35-36

Although *Vink does not explicitly teach that master 1 accesses a network*, master stations connected to networks were well-known.

Sur-Reply at 5; Petition at 20

Vink & Patrick / AAPA

Q. Well, let me ask you this. So we talked about a hierarchical address system.

Is there such a thing as a nonhierarchical address system?

A. I -- I mean, sure, I suppose, because lots of things are possible.

Q. Have you encountered such a nonhierarchical address system in your experience with networking?

A. Well, I -- I mean, I suppose there are other ways of -- of addressing items. I -- I think like, for example, Vink talks about addressing in some sort of order, all right? So -- so I -- I think in -- in that case, the -- the ordering is -- is not necessarily hierarchical there because it's based on ordering of the devices.

Sur-Reply at 7; Ex2027 at 54:19-55:2

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 transparent nature of the communication system according to the invention can then be retained without the need to transmit all the data bits to be exchanged via all the connected I/O modules.

Sur-Reply at 7; Ex 1005 at 11:29-37

Vink & Patrick / AAPA

Q. Okay. Well, my understanding of a hierarchical system based on what you've described is that basically, you have different tiers of addresses such that once you identify the address of a particular tier, then other tiers are grouped underneath that tier.

Is that -- is that a fair understanding?

A. Yeah. I -- I mean, I'm not trying to give a comprehensive, you know, all-encompassing definition here, but that generally seems to work under what I understand, you know, these types of -- of address schemes are.

Sur-Reply at 8-9; Ex 2027 at 55:3-13

Vink & Patrick / AAPA

Q. And -- and you could also have a system where you don't have any tiers but devices communicate with one another by having a precise address that corresponds only to a particular device. Correct?

A. I -- I mean, there may be some local systems that -- that work that way, you -- you know. But -- but in terms of broader interconnectivity to other devices, they -- they typically, because there's so many other devices to -- to -- that you could possibly communicate with. And then systems with large numbers of addressable computers are typically arranged in a more hierarchical fashion.

POR, 31-32; Ex 2027 at 55:3-56:19

Vink & Patrick / AAPA

Q. Why?

A. It's just -- I suppose it's -- well, I mean, some of the -- I can't tell you every reason why. But, you know, it -- it -- it -- you -- you -- you don't have to know details about the other end and you can still get to them, you know. So I don't need to know exactly where this computer is. I haven't -- and -- and neither does the network know where an exact computer is. It can route based on -- on the -- on the -- on the address prefix, which kind of can get it closer and closer to the ultimate destination.

You know, I -- I suppose local area technologies may -- may have some -- like, you know, if -- if you're not going outside your -- your -- your own space, your own network or subnetwork, then -- then it may look nonhierarchical at that point. But -- but, you know, in order to interact with the -- the rest of the network, you -- you know, it -- it helps to -- to have these hierarchies.

POR, 31-32; Ex 2027 at 55:3-56:19

i. Vink's System Is Compatible With External Networks

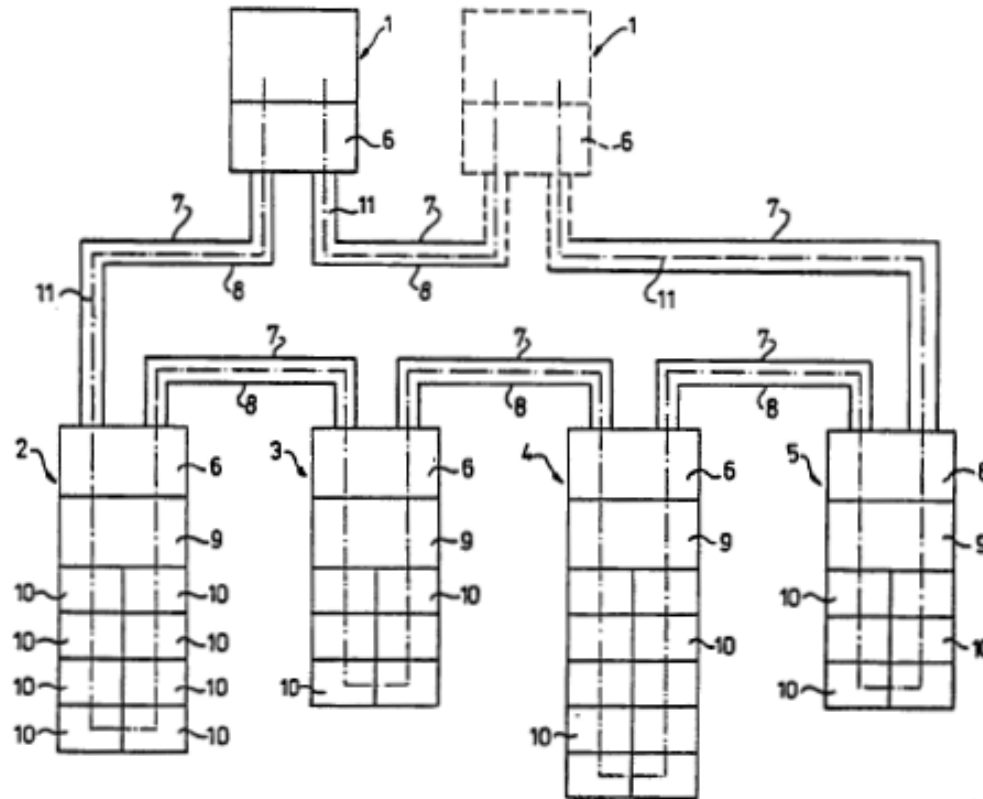
PO argues Vink teaches away from the combination because Vink *only* “discloses a non-hierarchical (or flat) address system, in which each slave is assigned *a fixed address based on its position in the cascade sequence employed in the Vink LAN.*” POR 34; *see also id.*, 29-36. That is incorrect because Vink discloses *both* non-hierarchical and hierarchical addressing schemes.

Sur-Reply at 6 (citing Reply at 11-13)

(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 recording data bits at the input side (34) and/or presenting data bits at the output side (33). A control module (9) comprises means (16) coupled to the 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 unambiguousness in the communication of cause-and-effect relationships at I/O level, in particular, for measurement and control applications, monitoring purposes and data acquisition.



POR, 39; Ex. 1005, Abstract

Vink & Patrick / AAPA

Q. So the claims, you said, are not limited just to measurement and control applications, monitoring purposes, and data acquisition. Correct?

A. Yeah, I -- I didn't -- I mean, the word "control" I think was used in the claims but not in the sense of a control application, but just con -- control, because it's a very broad term.

But -- but the -- the -- the claims of Vink don't -- don't restrict its invention to only measurement apps, for example.

Q. And one example you gave was changing the temperature at your home on the thermostat through your phone.

You haven't included that example in your declaration, have you?

A. No, I'm -- I'm pretty sure that that example's not there. And that's an example from today.

Q. What are some other examples you can think of as you sit here today?

POR, 38-39; Ex. 2027, 148:3-21

Vink & Patrick / AAPA

Q. You've described a number of applications that could be referred to broadly as the internet of things. Is that fair?

A. Well, today, sure. That's -- that's a phrase today.

POR, 38-39; Ex. 2027, 151:19-23

73. Third, none of Vink, Patrick, or the AAPA teach how to adapt masters in a limited local area network such as Vink's to interface with an external core network. In my opinion, this is for good reason, because even assuming a POSA wanted to combine Vink with Patrick or the AAPA, creating an interface for Vink's masters to an external core network would have been beyond the ordinary skill of a POSA as of the priority date of the '904 patent.

Sur-reply, 12-15; Ex. 2025, ¶ 73

Vink & Patrick / AAPA

74. A POSA would immediately understand that modifying Vink to interface with an external core network requires specific software to route and address packets from the external network to the master units and to the slaves. For example, adapting Vink so that its masters would provide an interface with a packet-switched network, as required by the claims of the '904 Patent, would require reprogramming Vink's non-hierarchical LAN protocols to allow for hierarchical addressing. Not only would such modification go against the teachings of Vink that a flat (or non-hierarchical) address system is desirable as explained above, but none of Vink, Patrick, and AAPA teach how to develop or obtain this software. Moreover, software necessary to translate non-hierarchical LAN protocols to allow for hierarchical addressing was not commercially available. This necessarily required custom solutions, which as of the priority date of the '904 patent required a significant time investment from an expert in the field such as myself. In my opinion, a person of ordinary skill as of the priority date of the '904 patent would not have been familiar with functionalities that the software would need to adapt Vink's LAN protocols and address system to make it suitable for access to external core networks, including procedures to translate non-hierarchical LAN protocols to allow for hierarchical addressing, and would not have been expected to create custom software to do so.

Sur-reply, 12-15; Ex. 2025, ¶ 74

75. As of the 1999 priority date of the '904 patent, designing a protocol that would render Vink compatible with an external core network (e.g., the internet) by providing it with hierarchical addressing capabilities was beyond the level of ordinary skill in the art of networking.¹ Indeed, providing access to such core networks was a relatively new field of endeavor in and of itself. As a result, the tools for connecting hierarchical to non-hierarchical networks were the subject of research, and the principles of their operation and function would not have been readily available to a POSA. Adapting Vink to interface with a hierarchical core network such as the internet (assuming a POSA would have been motivated to adapt Vink in such a manner, which as explained above, would not have been the case) would have required a deep familiarity with an array of networking protocols (in particular, intimate knowledge of the IP protocol stack, including data encapsulation, decapsulation, IP address assignment and acquisition, and the like) used to carry out essential networking functions. These subject matters were certainly not well-

Sur-reply, 12-15; Ex. 2025, ¶ 75

working on protocol stacks that were used for hierarchical address systems, I am personally familiar with the processes that engineering companies at that time would use to provide access to external networks. These processes routinely involved not only supervision but execution by people who far exceeded the level of ordinary skill in the art. I have seen nothing in Dr. Houh's declaration that suggest otherwise. Indeed, he has not even analyzed this issue. Thus, it is my opinion that a POSA would not have modified Vink's master units to comprise a physical interface to a packet-switched network.

Sur-reply, 12-15; Ex. 2025, ¶ 75

¹ Contrary to Dr. Houh's conclusory testimony, I am not aware of any off-the-shelf software suites or programs that would enable a POSA to provide Vink with the option of connecting to such a network. Indeed, Vink uses a sequential addressing protocol that was incompatible with internet addressing protocols as of the priority date of the invention.

Sur-reply, 12-15; Ex. 2025, ¶ 75