

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS, INC.,
Petitioner,

v.

ORCKIT CORPORATION,
Patent Owner.

Case IPR2023-00714
Patent 6,680,904

EXHIBIT 2025

DECLARATION OF MIGUEL GOMEZ

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I. INTRODUCTION

1. My name is Miguel Gomez. I have been retained as an expert witness to provide my independent opinion in regards with matters at issue in the inter partes review of U.S. 6,680,904 (“the '904 Patent”) in the IPR2023-00714 proceeding. I have been retained by Orckit Corporation (“Orckit”), the Patent Owner, in the above proceedings. Petitioner in this case is Cisco Systems, Inc. (“Cisco”).

2. Unless otherwise noted, the statements made herein are based on my personal knowledge, and if called to testify about this declaration, I could and would do so competently and truthfully.

3. My CV is being submitted herewith as Exhibit 2026 to this proceeding and is summarized in Section II, *infra*.

4. I am not a legal expert and offer no opinions on the law. However, I have been informed by counsel of the various legal standards that apply, and I have applied those standards in arriving at my conclusions.

5. The opinions I set forth herein are my own and are based on my education, experience, training, and skill I have accumulated.

II. QUALIFICATIONS

6. I received a Bachelor of Science in Electrical Engineering degree from Yale University in 1983. I have thirty-five years of experience in the design and

development of hardware and software technology used in computer systems, communications systems, networking and storage infrastructure, and database systems. My experience includes extensive knowledge of computer operating systems, programming languages, and mobile and embedded applications. I am also highly skilled in the use of microelectronics simulation software, ASIC and FPGA coding, in hardware design languages, including Verilog and VHDL. I'm also skilled at programming for embedded systems and applications in C, C++ and C#.

7. From August 2006 to March 2009, I was VP of engineering for ActSolar. ActSolar was a solar power converter and instrumentation company where I developed the system architecture that defined the hardware and software for a solar inverter and a data gathering and control sub-system. I wrote a control program in the C programming language to manage power conversion for the solar inverter. I also managed a small team of engineers that built the software defined radio responsible for retrieving solar panel data. The data gatherer utilized the IEEE 802.15.4 low-rate wireless personal area network (WPAN) standard to retrieve power and temperature readings from each solar panel and aggregate that data at a server. This information was used to maximize the solar array output.

8. In 2006, ActSolar was sold to National Semiconductor. The transfer of technology included the software radio for data collection, the inverter and a variant of the power converter hardware that performed shading compensation.

9. From September 2004 to August 2005, I was a consultant for BridgeWave Inc. I built a 10 Gbps Ethernet test platform to facilitate manufacturing tests of BridgeWave's high speed wireless network system. This system replaced the Smart Bits Ethernet test analyzer used in the manufacturing test environment. I also built a test generator, specifically an Ethernet packet generator, which generated packets of various sizes, address spaces, payload and checksums. I built a test receiver and analyzer which detected various failure mechanisms, maintained statistics and reported them to a user interface written in Lab View. A Xilinx Vertex II FPGA was employed in the first version of the test platform and a Xilinx Spartan 3e in the second version.

10. From September 2003 to March 2004, I was a consultant for PA Consulting Group. I provided hardware evaluation services for corporate mergers and acquisitions. These services included systems and hardware reviews in the following areas: (1) Analysis of system performance to the cost of the hardware implementation; (2) Review of the VHDL and Verilog code implementations, documentation and development strategies; (3) VHDL and Verilog code

management including compilation processes, simulation, test coverage, bug tracking and source code control; (4) FPGA and ASIC tool chain management; (5) Circuit board design and layout for production environments; (6) Circuit board certification testing for FCC, UL, and Environmental tests; (7) Review of production line management including assembly and test processes; and (8) Review of hardware code for copyright or license violations.

11. From January 2003 to May 2003, I was a consultant for Santel Networks. I developed an optical duo-binary (ODB) encoder. Operating at 10.7 Giga bits per second (GBps), ODB reduces the spectral spread to $\frac{1}{2}$ of the ordinary NRZ format. This format allows high spectral efficiency over long distances by reducing nonlinear penalties due to narrower channel spacing and allows a higher bit rate or increases transmission distances. The project was implemented in a Xilinx FPGA running at 667 Mhz with a 10.7 GHz Mux/Demux feeding 32 LVDS streams to the FPGA. The ODB behavior was simulated in a C-coded simulation. The circuit board's highest clock speed was 10.7 Gigahertz and was modeled in HSPICE. Board level simulation was performed using NCVerilog. Several patents were applied for and the board was shown at the Optical Fiber Communication Conference & Exposition in March of 2003.

12. From March 2001 to December 2002, I was Director of Hardware, Content Networking Division for Extreme Networks, Inc. I managed a team of hardware and software engineers that developed and maintained a Layer 2-5 Content Addressable Switch. The switch was capable of L2, L3, L4 switching as well as L5 switching. In the L5 mode, the SLB used HTTP and HTML headers to make routing decisions. All routing decisions were made in real time (1 GBPs) by hardware logic in FPGAs while a Power PC provided a user interface, configuration management and housekeeping diagnostics. Communications between the hardware elements and the PowerPC CPU was via a PCI bus. I was responsible for the system design as well as for managing the product manufacturing process.

13. From January 2000 to March 2001, I was Director of Hardware for Webstacks, Inc. (now Extreme Networks, Inc.). Extreme Networks and several venture founding partners commissioned Webstacks to build a Content Addressable Switch which would operate as a L2-5 server load balancer. This switch included content routing, load balancing, firewall and security capabilities utilizing Secure Sockets Layers (SSL). I was hired to be the system architect. My responsibilities included hiring the hardware and software engineers that would implement the server load balancer as well as set up the manufacturing process. I hired 13 ASIC, FPGA and software engineers into my department and managed them for the

duration of the project. Within one year, our team had developed the product and met Extreme Networks' acquisition criteria. Extreme Networks purchased Webstacks for \$68MM cash and stock.

14. From February 1997 to December 1999, I was a consultant for Philips Semiconductor. I developed Philips Semiconductors' portion of a certification environment used by Philips Semiconductor and Microsoft to verify operation of Philips' Poseidon handheld chipset running Windows CE. This included board development, C coding, FPGA coding and simulation as well as porting to Windows CE. Later, I supported the development of Philips' version of the MIPS 4000 with communications and storage devices to emulate a system on a chip. I also designed ASIC logic and board level hardware for a 56Kbs software modem while at Philips.

15. From September 1994 to January 1997, I was President and Founder of Minden Group, Inc. The Minden Group developed and sold several types of memory adapters and a video conferencing system. The adapters were designed to expand the memory capacity of Personal Computers while saving the customer money. Both the adapters and the video conferencing system were sold through retail stores throughout the United States and Canada. Over 250,000 memory adapters were sold at stores such as Fry's, CompUSA, Computer City and Future Shop. After developing these products, I organized and managed a team of 10 to 15

employees focused on sales, marketing, finance and production. Manufacturing of the primary components was performed through contract manufacturing in Taiwan with final assembly and distribution in the United States. Distribution included order fulfillment, contracted sales channel distribution networks and end-point retail management.

16. From August 1992 to September 1994, I was Senior Hardware Manager of RAID Product Development for MTI, Inc. In this capacity, I was responsible for architectural development of the next generation RAID 1-5 systems and for managing the product development group. I introduced several design approaches that resulted in lower product costs as well as methods for interfacing with the company's other hierarchical storage components.

17. From April 1989 to August 1992, I was Founder and President of Spectrum Analysis, Inc., a consulting services company. I founded and operated Spectrum Analysis, Inc. with three other partners. Spectrum Analysis, Inc. specialized in electrical circuit design with emphasis on FPGA and ASIC emulation and complex PCB level designs.

18. From September 1988 to March 1989, I was Applications Manager for Quickturn Systems, Inc. Quickturn developed an ASIC emulator using Xilinx FPGAs. I was hired as Quickturn's first applications engineer, and was initially

responsible for developing the training and demonstration systems for Quickturn's initial customers. Later, as the company matured, I managed the customer support team. Because this ASIC emulator worked at a fraction of clock speed, I developed a methodology of slowing board designs to a fraction of the original clock speed, (on the order of 100s of KHz) while maintaining clock and memory (DRAM) integrity.

19. From July 1987 to August 1988, I was an Applications Engineer for Telestream Corporation and was responsible for demonstration system development, training and sales support for a software based communications protocol converter product. From March 1985 to July 1987 I was a design engineer for StrataCom Inc., an early voice and data network equipment manufacture. StrataCom developed the IPX, a packet over leased T1 transmission and management system. I was responsible for the voice compression card as well as designing a way to include data over a primarily voice solution. The hardware I developed eventually evolved into the Frame Relay protocol. Cisco bought StrataCom in 1996.

20. From June 1983 to March 1985, I was a Design Engineer for ROLM Corporation. I was responsible for the development of a multiplex/demultiplex hardware board used in the ROLM BUS 295 telephone switch. A novel elastic buffer was used to automatically determine the length of an inter-cabinet data bus,

whose length varied based on the customer's requirements. This eliminated the need for manufacturing technicians to manually adjust clock skew.

21. A more detailed account of my work experience and other qualifications is listed in my Curriculum Vitae filed as Exhibit 2026 in this matter.

III. BASES OF OPINIONS

22. In the course of conducting my analysis and forming my opinions, I have reviewed the exhibits submitted to date in this IPR, as well as the Petition, Preliminary Response, and Institution Decision.

IV. APPLICABLE LEGAL STANDARDS

A. Ordinary Skill in the Art

23. My opinions in this declaration are based on the understandings of a person of ordinary skill in the art, which I understand is sometimes referred to as an “ordinary artisan” or by the acronym “POSITA” or “POSA” (person of ordinary skill in the art), as of the time of the invention. For purposes of this Declaration, I have been instructed to use December 1999 as the time of invention. I understand that the person of ordinary skill in the art is a hypothetical person who is presumed to have known the relevant art at the time of the invention. By “relevant,” I mean relevant to the challenged claims of the '904 Patent.

24. I understand that, in assessing the level of skill of a person of ordinary skill in the art, one should consider the type of problems encountered in the art, the prior solutions to those problems found in the prior art references, the rapidity with which innovations are made, the sophistication of the technology, the level of education of active workers in the field, and my own experience working with those of skill in the art at the time of the invention.

25. I was at the time of invention, and am currently, one of more than ordinary skill in the art through my education and research experience. As of the date of the invention, I am very familiar with the types of problems encountered in computer networking , the types of prior art solutions described in prior art references, and the rapidity at which innovations are made. Indeed, I am very familiar with people having this level of skill in the area of computer networking and am very familiar with commonly used technologies as Ethernet and the internet protocol / transmission control protocol (TCP/IP) suite. At the time of the invention, and since that time, I have been involved in the design and development of computer networks and in that capacity have worked with and managed teams of numerous individuals that would qualify as a POSA.

B. Claim Construction

26. I understand that claims of the patent-at-issue in this IPR are generally interpreted according to their ordinary and customary meaning taking into consideration the so-called “intrinsic evidence” of the patent consisting of (1) the claim language; (2) the specification; and (3) the prosecution history.

27. I understand that claim terms may be explicitly defined in the patent specification, or they may be implicitly defined through consistent usage in the specification. I also understand that the scope of claim terms may be limited by statements in the specification or prosecution history where the applicant clearly disavows or disclaims subject matter.

C. Obviousness (35 U.S.C. § 103)

28. I have been informed that a patent may be invalid if the claimed invention would have been obvious at the time the invention was made to a person having ordinary skill in the art. I have been informed that the following factors must be evaluated to determine whether Petitioner has met its burden of proof that a claimed invention is obvious:

1. The scope and content of the prior art relied upon by Petitioner;
2. The difference or differences, if any, between each claim of the patent and the prior art;

3. The level of ordinary skill in the art at the time the invention of the patent was made; and
4. Any objective indicia of non-obviousness, including, for example:
 - (1) commercial success of an embodiment; (2) a long-felt need; (3) skepticism; (4) failure by others to find the solution provided by the claimed invention; (5) copying by others of the subject matter of the claim invention; (6) unexpected results of the claimed invention; (7) acceptance of others and industry praise; and (8) licensing of the patents.

29. I have been informed that a claim is not proved obvious merely by demonstrating that each of the elements was independently known in the prior art. I have been informed that many, if not all, inventions rely on building blocks already known, and claimed inventions almost of necessity will likely be combinations of what is already known.

30. I have been informed that it is important in the obviousness inquiry to identify whether a reason existed at the time of the invention that would have motivated a person of ordinary skill in the art in the relevant field to combine or modify the prior art references in the manner proposed by the Petitioner to arrive at the claimed invention. Put another way, a finding of obviousness should be

supported by an apparent reason to combine or modify the prior art references as proposed by the Petitioner.

31. I have been informed that it is important in the obviousness inquiry that it is understood how the combination of references is supposed to work. An explanation of the operation of the combined references is often a prerequisite to showing that a person of ordinary skill in the art would have been motivated to make the proposed combination and would have had a reasonable expectation of success.

32. I have been informed that a finding of obviousness “requires the additional showing that a person of ordinary skill at the time of the invention would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention.” *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011). In addition, I have been informed that a person of ordinary skill in the art should have had a reasonable expectation of success in combining the references as proposed.

33. In assessing obviousness, I have been instructed to consider both the ordinary creativity and common sense of the person of ordinary skill in the art. I also understand that it is impermissible for common sense to be applied to fill gaps in prior art that fails to teach or suggest a limitation of the claim. I also understand that the obviousness inquiry should guard against hindsight bias or hindsight

reconstruction where after-the-fact reasoning is applied to combine prior art elements using the claimed invention as a template, without establishing that, as of the date of the invention, there exists a motivation to combine or apparent reason to combine the prior art as proposed.

34. In assessing obviousness, I have been instructed that, to qualify as proper prior art for an obviousness analysis, a reference must qualify as analogous art. I have been informed that a reference qualifies as analogous art with respect to the claims if it is either: (1) from the same field or endeavor as the patent; or (2) the reference is reasonably pertinent to the particular problem addressed by the invention. I have also been informed that for a reference to be reasonably pertinent, it must logically have commended itself during the ordinary course of development to an inventor's attention in considering his problem.

35. In assessing obviousness, I have also been instructed that, as noted above, secondary considerations can often be probative evidence of non-obviousness and can serve to avoid hindsight bias. I have been instructed that secondary considerations can be sufficient to overcome a prima facie case of obviousness. I have been instructed that Patent Owner can show non-obviousness if: (1) the industry praised their work; (2) their design was copied by others; (3) their design

achieved a high level of commercial success; or (4) their invention had unexpected beneficial results, for example.

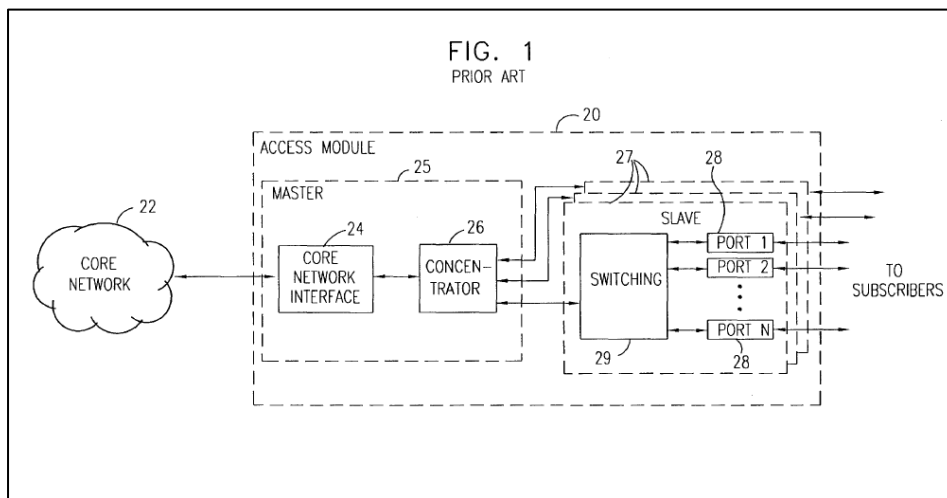
V. OVERVIEW OF THE '904 PATENT AND THE STATE OF THE ART

A. Technical Background of the '904 Patent

36. The '904 Patent is titled “Bi-directional chaining of network access ports” and is directed to apparatuses and methods for providing network subscribers with access to a core network. Ex. 1001, 1:34-39, 2:4-22. Its claims are directed to an improved subscriber access system (*e.g.*, the “Digital Subscriber Line Access Multiplexer (DSLAM) systems”) for subscribers to connect to high-speed networks. *See, e.g.*, Ex. 1001 at 1:25-33.

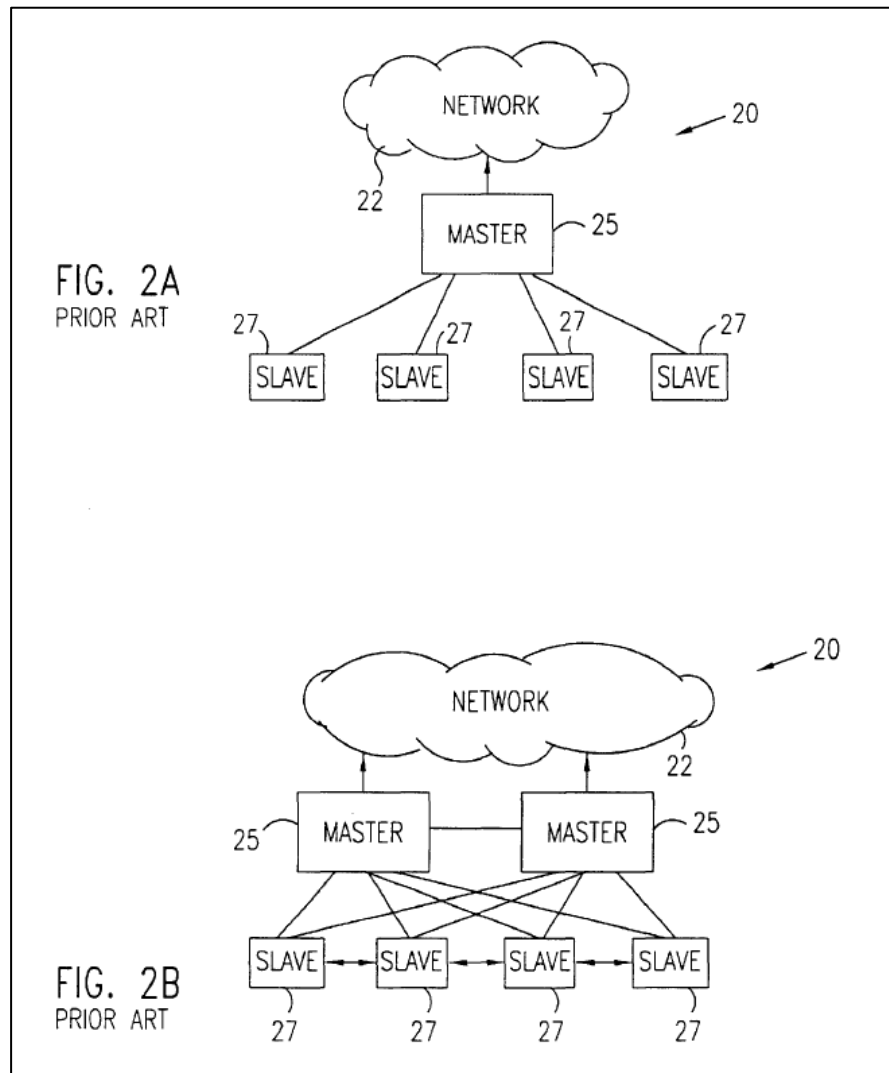
37. The '904 Patent teaches that network access services typically aggregated subscribers of network access services (*e.g.*, “DSL subscribers”) together in access systems (*e.g.*, “DSLAM”) to connect to high-speed networks because the “high cost of network bandwidth” had to be designed to serve “between 100 and 1000 subscribers” and “concentrated their traffic through one or a few network trunks.” *Id.* “The need to serve such a large and potentially variable number of subscribers in [each such system] led to the development of ‘multi-shelf’ access architectures.” *Id.*

38. The '904 Patent recognized that multi-shelf architecture systems and related topologies were known in the art as of the priority date of the '904 patent, but sought to improve upon the then-known systems by introducing a topology that improved fault tolerance. For example, Fig. 1 shows a prior art multi-shelf access system in which subscriber lines obtain network access to a “core network” through an “access module” that consists of: (i) a master (i.e., a network device providing a “core” interface through which data is received from a plurality of downstream “slave” units and transmitted upstream to the core network) and (ii) a number of slave units that switch traffic received to/from ports to various subscribers. *See, e.g.,* Ex. 1001 at 1:34-51, 6:22-53, Fig. 1.



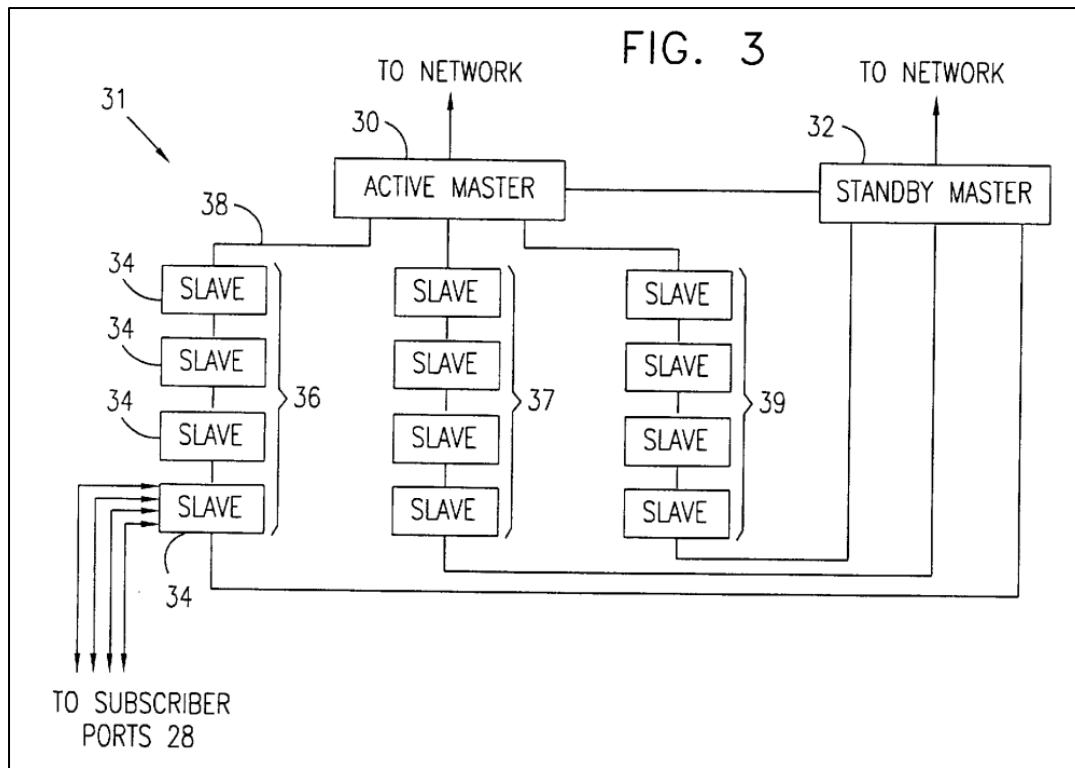
39. As another example of a then-known multi-shelf system topology, Fig. 2A shows a “star” topology in which each slave is connected only to a single master, and as shown in Fig. 2B, in a “redundant star” topology, each slave unit is connected

to two or more alternative master units, so as to provide protection in case of a failure in one of the master units. *See, e.g.,* Ex. 1001 at 1:52-59.



40. While the topologies above were known by the art, the '904 Patent teaches innovative apparatuses and methods that improve upon prior art multi-shelf access architecture through a multi-shelf access system that provides efficient, high-speed transfer of data packets with improved robustness and reliability. The claims

of the '904 Patent recite apparatuses and methods for deploying multi-shelf network access systems that generally utilize—among other elements—the following improved elements and features: (i) two network devices termed “master units” (“first” and “second”) that provide a “physical interface” to a “packet-switched network” (*e.g.*, a “core network” such as the internet); (ii) a plurality of network devices termed “slave units” (*e.g.*, network switches) that comprise “one or more ports to respective subscriber lines;” (iii) one or more “daisy chains” of slave units in which the slaves are connected in series (*i.e.*, such that a first slave is connected to the second slave, the last slave is connected to the second-to last slave, and every slave in between is connected to the slave immediately preceding it and to the slave immediately succeeding it); and (iv) in each daisy chain, the first slave is connected to the first master unit but not the second master unit, and the last slave is connected to the second master unit but not the first master unit. *See, e.g.*, Ex. 1001, abstract, 2:4-22, claims 1, 4, 9, 11, 14, 19. Figure 3 shows an exemplary embodiment of the claimed invention:

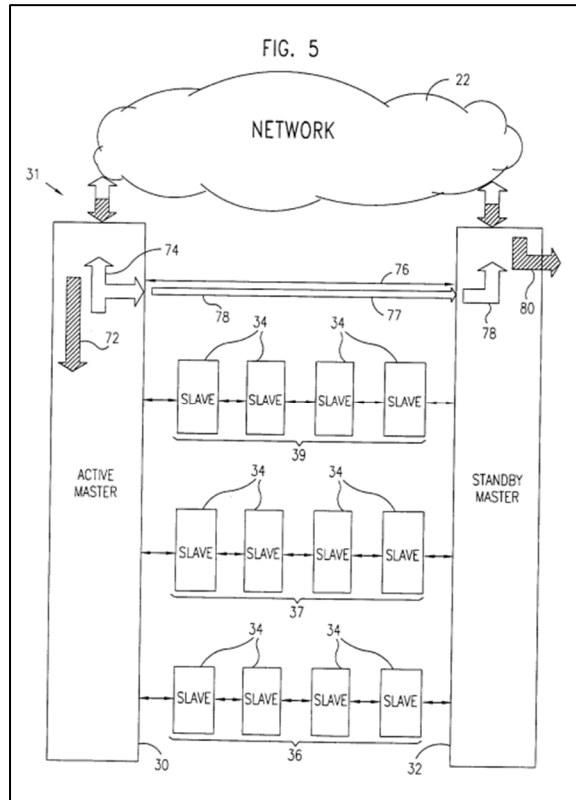


Ex. 1001, Fig. 3.

41. As shown by the embodiment of Fig. 3, the two master units 30 and 32 are linked to one another and to a plurality of slave units, each of which belongs to one or more daisy chains 37, 38, and 39. Ex. 1001, 6:21-36. “Each slave comprises multiple subscriber ports 28, which link system 31 to respective subscriber locations.” *Id.* The two masters are designated “active” and “standby.” “Master 30 is termed the active master, because in normal operation of system 31, i.e., in the absence of faults in the system, downstream traffic from the network is routed from master 30 down chains 36, 37 and 39 to the respective slaves 34. Upstream traffic from the slaves is likewise routed up the chains to master 30.” Ex. 1001, 6:38-54.

“In case of a fault in one of chains 36, 37 or 39[,] the traffic direction in all or a part of the faulty chain is reversed. Packets are then directed between some of the slaves and standby master 32, rather than directly between the slaves and active master 30. When a serious failure occurs in the active master, all traffic may be directed through the standby master.” Ex. 1001, 6:38-54.

42. “FIG. 5 is a block diagram that schematically illustrates details of data packet flow in system 31 under normal, fault-free conditions.” Ex. 1001, 8:31-41.



Ex. 1001, Fig. 5. “Hatched arrows, such as an arrow 72, represent downstream data flow, while unfilled arrows, such as an arrow 74, represent upstream data flow.

Packets received from network 22 are routed by active master 30 down each of chains 36, 37 and 39, as indicated by arrow 72.” Ex. 1001, 8:31-41.

43. The '904 Patent discloses that the advantages for this architecture include robustness and scalability, among others. The claimed arrangement provides redundancy by deploying a second master and limits the effects of faults in the slaves, for example, by reversing the direction of data traffic in the event of a fault in one of the daisy chains while allowing for the addition of more slaves “as needed, without having to change the number of interfaces associated with masters 30 and 32.” Ex. 1001, 2:46-52, 4:4-38, 6:34-36.

B. Petitioner’s Cited References

44. The Petition asserts the following two grounds:

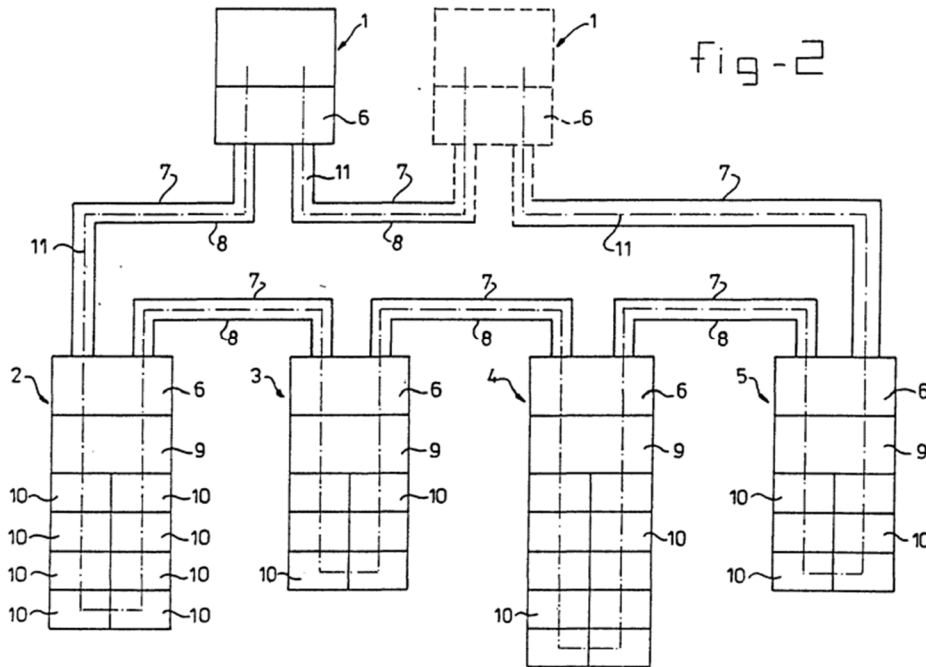
Ground	Claims	Basis
#1	1-26	35 U.S.C. § 103 over Vink and Patrick
#2	1-26	35 U.S.C. § 103 over Vink, Patrick, and AAPA

Paper 1, 2-3.

1. Vink (Ex. 1005)

45. Vink (WO 91/14324) is titled “Method and communication system for the bit-serial exchange of data” and describes a system comprising a master station

(1) connected to substations (slaves) (2, 3, 4, 5) via transmission rings (7, 8). Vink's system is shown in its Fig. 2:



Ex. 1005, Figure 2. “The master 1 and the slaves 2, 3, 4, 5 are mutually connected via a double-ring transmission system composed of transmitting/ receiving units 6 and transmission lines 7, 8. The transmission lines 7, 8 may, for example, consist of coaxial cable, optical fibre cable and the like.” Ex. 1005, 15:31-35.

46. “The master station and the substations of said communication system each form a node between which information is bit-serial exchanged.” Ex. 1005, 11:9-11. “Each slave 2, 3, 4, 5 comprises a control module 9 which is connected to the associated transmitting/receiving unit 6 and to which one or more input (I)

and/or output (0) module(s) are connected. The number of I/O modules 10 to be connected to a control module may vary from slave to slave depending on its function, for example controlling a measurement and control process.” Ex. 1005, 15:36-16:4. “The operation of the relevant transmission ring 7, 8 can be monitored by means of line error detectors 15.” Ex. 1005, 17:10-13. “[T]he data bits by the slave or the I/O modules can take place in synchronism with the transmission of the data bits via the transmission system 7, 8. All these features result in a transparent communication structure.” Ex. 1005, 17:25-29.

2. Patrick (Ex. 1006)

47. Patrick (U.S. Patent No. 5,790,541) is titled “Apparatus, method, system and system method for distributed routing in a multipoint communication system” and describes a method and system “for distributed internetwork routing of information in a communication system.” Ex. 1006, abstract. Patrick’s system is disclosed as comprising a primary station 101 connected to a network 105 and a plurality of secondary stations 110 as shown in Fig. 1. Ex. 1006, 3:11-15. The connection between the primary station and secondary stations may be a hybrid optical fiber, a coaxial cable, a fiber optic cable, a twisted pair wires, or wireless and satellite communication. Ex. 1006, 3:15-20. The connection between the primary

station and the network may be through “the Internet, on line services, telephone and cable network.” Ex. 1006, 3:20-24.

48. Patrick further suggests that a prior art terminal may be connected to a MAC network such as a LAN or ATM network. Ex. 1006, 5:39-49, 2:36-39. Patrick however criticizes these connections as “problematic.” In particular, Patrick provides that:

The prior art routing methodology illustrated in FIGS. 6 and 7, as mentioned above, is problematic when applied to the IP routing protocol in a centralized network involving potentially thousands of geographically distributed secondary nodes. Such a network is envisioned when ATM or other metropolitan-area networks provide connections of millions of consumer homes to the Internet. The principal problem is the relative dearth of IP addresses, as the IP protocol uses only 32 bits to encode both the network portion and the host portion of the internetwork address.

Ex. 1006, 8:36-56.

C. Level of Ordinary Skill

49. The Petition and Petitioner’s expert assert:

[A] person of ordinary skill in the art (“POSITA”) in the field of the ’904 patent as of its effective filing date of December 27, 1999, would have had a Bachelor’s degree in electrical engineering, computer science, or equivalent training, and approximately two years of work

experience in information technology and networking. In my opinion, additional education could make up for less practical experience, and vice versa.

Ex. 1003, ¶59. I do not dispute Petitioner’s level of ordinary skill for purposes of this declaration.

50. My level of qualifications as described in Section II meet this level of ordinary skill as of the priority date of the ’904 Patent.

VI. CLAIM CONSTRUCTION

51. I understand that Patent Owner has proposed the term “subscriber line” to mean “communication lines to users of subscription-based network services.” In my opinion, this construction is consistent with the understanding of a POSA as informed by the ’904 Patent’s specification.

52. The ’904 Patent’s specification describes “subscriber lines” as for users of subscription-based network services. For example, the ’904 Patent discloses a “Digital Subscriber Line (DSL)” “that enables broadband digital data to be transmitted over twisted-pair wire, which is the type of infrastructure that links most home and small business subscribers to their telephone service providers.” Ex. 1001, 1:10-14. Furthermore, the specification states that the preferred embodiment is a “multi-shelf access system,” which the specification describes as for the purpose of providing high speed network access. Ex. 1001, 2:4-10, 1:10-33. Based on these examples, a POSA

would understand that the claimed subscriber lines must be part of a broader infrastructure used by network providers to provide subscribers with access to a network, rather than simply connections between devices deployed in a local network.

53. Additionally, the '904 Patent explains that the claimed subscriber lines “enable users to access digital networks at speeds tens to hundreds of times faster than current analog modems and basic ISDN service” and “thus opens the most critical bottleneck in local-loop access to high-speed networks, such as Asynchronous Transfer Mode (ATM) and Internet Protocol (IP) networks, without requiring major investments in new infrastructure.” Ex. 1001, 1:14-24. The '904 Patent provides examples of a multi-shelf architecture that can be used to connect thousands of subscribers utilizing a multi-shelf access system to a high-speed network:

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.

Ex. 1001, 1:20-33.

54. The '904 patent describes a preferred embodiment with protective mechanisms designed to minimize the disruption that may be experienced by subscribers using multi-shelf access systems to access those high-speed networks, which the patent describes as “core networks:”

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 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 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 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.

Ex. 1001, 2:4-27.

55. In my opinion, these disclosures are all consistent with “subscriber lines” being “communication lines to users of subscription-based network services.”

VII. NO COMBINATION OF THE CITED PRIOR ART REFERENCES TEACHES OR SUGGESTS EVERY LIMITATION OF THE CLAIMS

A. Vink, Patrick, and AAPA do not suggest “master units...comprising a physical interface to a packet-switched network” (Claims 1, 4, 11, 14, and 19)

1. The '904 Patent's claims are directed to core network access systems in which two masters provide an interface to a core network.

56. A preferred embodiment of the invention of the '904 Patent is “a multi-shelf access system” in which an active master unit provides network access to slave units that comprise ports to subscriber lines by “receiv[ing] data packets from a core network” and “transmit[ting] packets back upstream to the network.” Ex. 1001, 2:6-10. Thus, the '904 Patent describes its topology as directed to providing network access to subscribers. Consistent with the disclosed preferred embodiment, the '904 Patent's claims require (i) two master units that comprise “a physical interface to a packet-switched network;” (ii) slave units that are connected to one another in one or more “daisy chains;” and (iii) a “first slave unit” in each daisy chain “connected ...

to the first master” as well as a “last slave unit connected ... to the second master unit.”

57. Given that the masters must provide an interface to a packet-switched network, the claimed “packet-switched network” must therefore be a “core” network that is external to the one or more loops formed by the two masters and each of the daisy chains. That the masters provide an interface to an external, core network (i.e., a subscriber-based network such as the internet) is further supported by the requirement in the claims that each of the slave units comprise ports leading to “subscriber lines.” Thus, all of the claims must require an external network and the master units providing a physical interface to that external network.

2. Vink discloses a LAN topology in which there is no interface to a core network, let alone through two masters as required by the claims.

58. Whereas the '904 Patent is directed to a system for providing subscribers access to an external “core” network, Vink describes an entirely different communication system in which the masters do not provide an interface to an external network. Ex. 1005, 1:6-15. Vink does not disclose any connection to an external network. Instead, Vink describes a local area network in which devices are connected by coaxial cables and the like to one or more masters in a cascade arrangement. Ex. 1001, 1:11-34. In this system, no device is even connected to an

external “core” network. Instead, Vink teaches that its cascade arrangement may be used to improve connections between devices that connect to one another on a local area network, which Vink describes as generic commercial equipment (I/O modules) used under the control of a master station:

The invention relates to a method and a communication system for exchanging data in discrete or digital form with one or more input (I) and/or output (O) modules, by means of serial transfer of data bits under the control of at least one master station (master). Communication systems of this type are in practice known per se. Examples are the so-called “Local Area Networks” (LAN’s) in, inter alia, office, factory, hospital and production environments.

Ex. 1005, 1:6-15.

59. Vink discloses that the commercial equipment in its LAN may be further connected to peripheral devices that utilize local data buses such as VME and SCSI and local data protocols to achieve the connections. Vink states that it is known in the art that such systems may suffer from delay issues that interfere with the system’s ability to provide the “cause and effect unambiguousness” that is required in the “control environments” in which those systems are deployed:

Communication systems constructed in accordance with the LAN concept generally have the disadvantage that, for use in, for

example, industrial measurement and control environments having a large number of I/O points (for example 1,000 or over), they are too slow to be able to fulfil the required cause-and-effect unambiguousness, owing, among other things, to the communication protocols needed. Because the information is transferred bit serially via the network but, on the other hand, is generally processed in parallel by the stations connected via bus networks, such as the known VME bus and SCSI bus, used for coupling microcomputer systems and peripheral equipment, a further delay can arise as a consequence of the required parallel-to-serial (P/S) and serial-to-parallel (S/P) conversion, which may be understood as follows.

Ex. 1005, 2:5-17

60. Based on these disclosures, Vink's system would be understood as a closed network of devices that does not provide access to an external (or "core") network. Vink states that it is a "method and communication system [to] provide unambiguousness in the communication of cause-and-effect relationships at the I/O level, in particular, for measurement and control applications, monitoring purposes and data acquisition." Ex. 1005, 2:5-17. There is no teaching in Vink of how to connect its local network to a core network. Nor is there any teaching in Vink of how to provide any interface for its masters to connect to a core network.

3. A POSA would not modify Vink to provide an interface to a core network.

61. In my opinion, a POSA would not modify Vink's closed network of devices to connect it to an external core network. Indeed, Vink does not disclose an external core network at all or inform a POSA of how to connect its closed network to an external core network.

62. There are multiple reasons why a POSA would not have used (or adapted) Vink to provide subscribers with access to an external core network. First, Vink's disclosed system is limited to a local area network that utilizes communication protocols that a POSA would understand to be incompatible with systems—such as those described by the '904 Patent or AAPA—used to provide subscribers with access to an external network. A POSA would understand that devices with access to an external packet-switched network (such as the Internet) must be assigned hierarchical addresses. A hierarchical address is an address having multiple levels (a hierarchy), with each level identifying a specific subnetwork in the hierarchy. For example, the Internet can be thought of as divided into multiple subnetworks, each of which may comprise multiple smaller subnetworks. The last subnetwork in that hierarchy of subnetworks typically identifies specific machines that may connect to one another as well as gain access to the core network through the same subnetwork. Consistent with this hierarchical arrangement of subnetworks,

IP addresses used on the Internet identify the highest level subnetwork, followed by the lower level subnetworks in order, and finally identify the specific machine on the lowest level subnetwork (e.g., IP addresses assign the first 24 bits of the 32-bit address to identify subnetworks, and the last 8 bits to identify machines on the lowest level subnetwork).

63. In addition, by identifying the subnetworks by level, hierarchical addressing allows data to be routed to the relevant top level subnetwork and then to the relevant subnetwork on each subsequent hierarchical level until arriving at the machine on the lower level subnetwork.

64. This type of hierarchical addressing is necessary for providing access to core external networks such as the Internet including because address hierarchies are needed to allow network devices to route data to other devices on the core network in a consistent format and a finite bit flat address system can only represent a limited number of addresses, which is insufficient to accommodate the exponentially growing number of subscribers/users and associated addresses on such networks.

65. A POSA at the priority date of the '904 Patent would thus understand that the masters of the '904 Patent—which provide an interface to a core network—must utilize hierarchical network protocols and addressing systems to communicate between the network and the slaves.

66. In contrast to core network access systems that employ hierarchical addressing and related protocols, Vink—which is directed to a local area network—discloses local protocols that employ non-hierarchical addressing for communication between the master and other devices on its LAN, as explained below. Ex. 1005, 8:19-23, 11:32-34, 17:38-18:13, 16:11-14. Vink refers to the types of local communication protocols that can be used with its LAN topology:

LAN topologies generally used in practice are star, bus, ring and tree configurations in which the data bits are transferred serially to the connected stations. Generally in packet form, that is to say a particular station cannot transmit uninterrupted information but only packets containing a measured information content. A large variety of protocols, such as CSMA/CD "token passing", Aloha etc., have been developed for controlling the communication.

Ex. 1005, 1:24-34

At least as of 1999, a POSA would know that these protocols (e.g., Aloha and CSMA/CD “token passing”) are suited to LAN communications. Vink’s disclosure of these protocols would suggest to a POSA that Vink’s network topology is limited to a LAN.

67. 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 Vink's LAN. Ex. 1005, 8:19-23 ("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..."). Vink states that the devices in its local area network are provided unambiguous addresses, from which it would have been evident to a POSA that its addressing system is non-hierarchical:

- 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. Ex. 1005, 11:29-34.
- As already discussed in the introduction, every slave can be provided with an unambiguous address and the addressing of the separate I/O modules 10 can take place on the bases of their sequence in the cascade arrangement. Consequently, a unit 20 which is capable of decoding the address of a slave, a unit 21 which is capable of detecting information about the number of data bits for a relevant slave and, if necessary, a unit 22 which is capable of reading out information about the type coding of the I/O modules connected to the local data bus, for example a module

having only an input side or a module having only an output side, are provided. Ex. 1005, 17:38-18:13.

As a result, the whole again has a structure corresponding to a shift register, every I/O module being implicitly addressed, as in the system according to Figure 1, by its position in the chain. Ex. 1005, 16:11-14 .

68. Each of these disclosures confirm to a POSA that Vink teaches that its local area network uses an unambiguous (or fixed) addressing system that assigns non-hierarchical addresses to its slaves, and that using such a non-hierarchical addressing system is needed “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.” Ex. 1005, 11:26-37.

69. Thus, using a non-hierarchical address system is essential for the operation of Vink’s system. Based on these disclosures, the POSA would conclude that (i) Vink’s non-hierarchical network cannot communicate with a core network such as the Internet, since doing so would require a hierarchical addressing system and (ii) Vink teaches against adapting its network for use with a hierarchical addressing system, since doing so would eliminate the purported advantages

associated with using a non-hierarchical system, i.e., the exact opposite of what is needed to hook up Vink's LAN to the Internet.

70. Second, in my opinion, a POSA would not have any reason to modify Vink to provide an interface to a core network based on Patrick or AAPA. Dr. Houh's declaration provides one generic advantage for the proposed modification, that the subscribers connected to Vink's communication system "would have benefitted by gaining access to more information and being able to connect to more computers and servers to exchange information than what would have been available on an internal-only network." Ex. 1003, ¶81. Vink however discloses not subscribers but rather "measurement and control applications, monitoring purposes and data acquisition," and a POSA would thus not have considered these applications to be subscribers that would benefit by gaining access to an external network.

71. Indeed, Vink teaches against assigning hierarchical addresses as would be required to interface with an external core network. Specifically, Vink discloses a LAN that is used for connecting a series of network devices (not subscribers, as discussed below) connected by local data buses such as SCSI. Ex. 1005, 1:6-15. Vink teaches that it is advantageous to use non-hierarchical addressing because the addresses of each slave will indicate the order of the slave in sequence. *See, e.g.,*

Vink at Abstract (“The present method and communication system [for which it is advantageous to the specific purpose of] provid[ing] 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.”). A POSA would recognize that there is no reason to connect Vink’s system—which is directed to peripherals and does not teach subscribers—to provide access to an external core network. Indeed, Vink already operates effectively for its intended purpose of enabling “measurement and control applications, monitoring purposes and data acquisition” without an interface to such a network. There is no reason to modify it with an interface to an external network, particularly when the modification required for the interface (use of hierarchical addressing) is incompatible with one of Vink’s primary teachings (use of fixed addresses to indicate positions of slaves). Nor is there any reason for a POSA to modify either AAPA or Patrick to employ the topology disclosed in Vink. For these reasons, a POSA would not modify Vink in light of Patrick and AAPA to provide access to an external core network.

72. Further, to the extent that a POSA wanted to design a system that conferred Petitioner’s purported benefit of “gaining access to a wider array of information that is available on the external network,” such a POSA could simply

practice AAPA or Patrick with respect to any devices as to which it would be desirable to provide access to an external network and would have no reason to engage in the exercise of adapting Vink, as there is nothing suggesting that Vink's topology would render the systems of Patrick or AAPA more effective in conferring that benefit. A POSA seeking to obtain such benefits would not use Vink—a system whose non-hierarchical design principles are ill-suited for use with external networks—as the starting point of a system for providing subscribers with access to an external core network, such as the multi-shelf access system disclosed by the '904 Patent.

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.

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.

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-known as of the priority date of the '904 Patent and would have required skill beyond that of a POSA. I was more than a person of ordinary skill in the art as of 1999 with extensive experience in these types of networks. Through my experience

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.

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.

B. Vink, Patrick, and AAPA do not suggest "slave unit comprising one or more ports to respective subscriber lines" (Claims 1, 4, 11, 14, and 19)

76. Every independent claim of the '904 patent requires a "slave unit comprising one or more ports to respective *subscriber lines*." Thus, all of claims 1, 4, 11, 14, and 19 (and their dependents) require that each of the "slave units" comprise "one or more ports to respective subscriber lines."

77. As I explained in Section VI above, a POSA would understand a subscriber line to be "communication lines to users of subscription-based network services." For example, the '904 Patent describes its preferred embodiment as "a multi-shelf access system" in which the disclosed master / slave configuration provides fault protection for one or more subscribers accessing the external network

through the master / slave system. Ex. 1001, 1:10-33. Furthermore, the specification states that the subscribers could be DSL subscribers who receive internet access through the described access architecture. *Id.* Thus, the claims and specification support a construction of “subscriber lines” as “communication lines to users of subscription-based network services.”

78. In my opinion, unlike the '904 Patent, Vink does not teach slave units comprising ports to “subscriber lines” (which are “communication lines to users of subscription-based network services”). Vink discloses that its slaves are devices connected by I/O modules 10 to peripherals—not subscribers. Ex. 1005, 1:6-34. Vink explicitly confirms that its I/O modules 10 are connected via a local bus, “such as [a] VME bus or SCSI bus[,] to couple microcomputer systems and peripheral equipment together.” Ex. 1005, 2:5-3:5; abstract (“The 1/0 modules (10) are connected in cascade to a control module 11 (9) via a local data bus (19) for serial bit transfer”); 13:28-14:1; 20:2-12. Based on these disclosures, a POSA would understand that Vink’s slaves communicate with peripheral devices which themselves are not subscribers.

79. I understand that Dr. Houh’s declaration asserts that Patrick and AAPA disclose “subscriber lines” and “[i]t would have been obvious to combine Vink with

Patrick (for Ground 1) and further with AAPA (for Ground 2) to include ports that would have been connected to subscriber lines.” Ex. 1003, ¶¶108-110. I disagree.

80. As discussed in Section VII(A) above, a POSA would not be motivated to combine Vink with either Patrick or AAPA. Vink is not compatible with a subscriber-based network and teaches against the protocols necessary to render operable such a network. Vink discloses a local area network having fixed addresses for its slaves. Ex. 1005, 17:38-18:14. Unless a slave utilizes a hierarchical address and not the fixed address explicitly taught by Vink, a POSA would understand that communications originating from the external network could not be addressed to that slave. Using a non-hierarchical address in connection with the slaves—such that the slaves could not communicate with the external network—would be understood to a POSA to defeat the purpose of providing subscriber lines in the Vink topology. For these reasons, Vink’s slaves would not access an external network with a fixed address.

81. Moreover, a POSA would not have substituted Patrick’s or AAPA’s alleged “subscribers” in Vink’s system. As I discussed above, Vink explicitly discloses that it does not use hierarchical addressing, and since Vink discloses that the slaves are addressed based on each slave’s order in series, a POSA would not assign a hierarchical address to any slave. A POSA would understand that replacing

Vink's stated fixed addresses with hierarchical addresses would defeat the purpose of the fixed addresses in representing the order of the slaves. Thus, adapting Vink in light of Patrick/AAPA would have been outside a POSA's skillset as of the relevant timeframe.

82. For these reasons, Vink does not disclose slave units comprising ports to subscriber lines, and a POSA would not use the systems disclosed by either Patrick or the AAPA as "subscribers" in Vink's system.

C. Vink, Patrick, and AAPA do not suggest "in normal operations, 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" (Claim 4)

83. Claim 4 requires "in normal operations, 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." A POSA would thus understand that claim 4 requires that—in normal operations—downstream packets from the network and upstream packets from the slaves/subscriber lines pass in opposite directions, via the first slave to the first master.

84. Vink however describes data passing in one direction through its topology—data is passed from the active master through the slaves in cascade to the passive master. Specifically, Vink describes the process for supplying data from the active master to the slaves in the cascade as follows:

- 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*;
- supplying control information to the slaves via the transmission system; and
- presenting and/or recording data bits of the I/O modules connected to a respective slave under the influence of the control information received, controlled by the slaves.

Ex. 1005, 6:16-27.

85. Based on this disclosure, a POSA would understand that Vink teaches 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. Vink describes the sequence of transmission from the master to the slaves and the sequence of transmission from the slaves to the master as the same. Therefore, the

slaves must transmit and receive data to the masters in the same order as that in which they are arranged. 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).

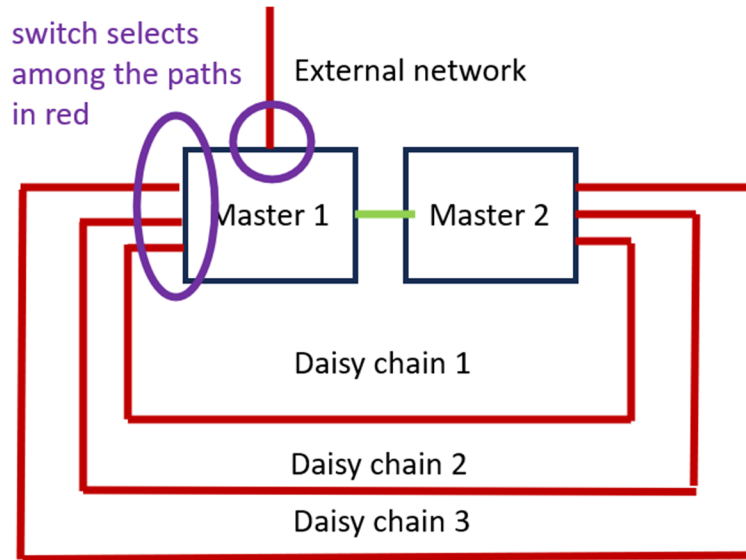
86. Claim 4 however explicitly require that downstream packets from the networks and upstream packets from the subscriber lines pass in opposite directions.

87. I understand that Dr. Houh testifies that Vink teaches a “very flexible system” that is “designed to transmit or receive packets of data bits via a transmission system ring in one and/or the other direction.” Ex. 1003, ¶123. I note however that this disclosure does not state that upstream and downstream traffic occur in opposite directions in normal operations. Rather, this disclosure is related to Vink’s disclosure to reverse the transmission direction in the event of a fault. This is confirmed by the very next sentence, which states that “[m]aster and/or slaves constructed in this way are capable of functioning as a switching centre so that, for example, the master is able to reach as many connected slaves as possible in a fault situation.” Ex. 1005, 14:31-34. In the context of these disclosures, a POSA would understand that Vink teaches reversing the direction in the event of a fault. Given this context, a POSA would not understand Vink’s reference to “one and/or the other

direction” to suggest that the upstream and downstream packets simultaneously flow in different directions.

D. Vink, Patrick, and AAPA do not suggest master units comprising a switch and a pre-switch (Claim 9)

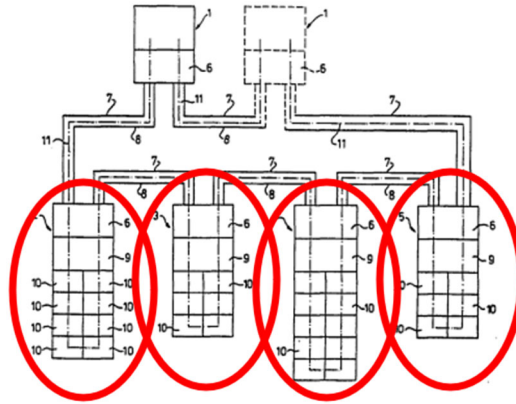
88. Claim 9 requires “a switch[] configured to route data packets between the respective physical interface and the one or more daisy chains.” A POSA would understand that “a switch[] configured to route data packets between the respective physical interface and the one or more daisy chains” selects among the external network and the plurality of daisy chains to route data packets. To be clear, switching between the physical interface (to the external network) and the one or more daisy chains is illustrated in the following diagram which shows the possible paths that the switch must select (those being the external network or the daisy chains):



89. Vink does not suggest a master that selects among the external network and the plurality of daisy chains to route data packets—nor does the Petition and Dr. Houh allege this. Instead, the Petition and Dr. Houh’s declaration state that Vink discloses control unit 36 and transmitting/receiving unit 6 which routes data to a slave on a particular path. Pet., 47-48; Ex. 1003, ¶129 (“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 control[] the data flow via the transmission lines 7, 8.”). In other words, Dr. Houh’s opinion is that Vink’s alleged switch selects a particular slave in one daisy chain.

90. Selecting a particular slave in a path however is not the same as selecting among possible paths (including the external network and a plurality of daisy chains). A POSA would understand that, when control unit 36 and

transmitting/receiving unit 6 selects a slave in a path, they do not select one of several possible paths:



Vink's controller selects among these slaves in a single chain—not among one or more chains and the external network

91. A disclosure of selecting a specific slave on a path as in Vink does not meet claim 9's requirement to select a daisy chain or an external network. In my opinion, even if Vink discloses addressing packets to a particular slave on a path, Vink does not disclose that its controller is able to select between multiple daisy chains and the external network.

92. The same analysis applies to claim 9's pre-switch. Claim 9 requires that the pre-switch, "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.” In other words, in the event of a fault, the pre-switch identifies “another” daisy chain and reroutes the data packets through that other chain rather than through the faulty chain.

93. In my opinion, Vink does not disclose this limitation for the same reasons. The Petition alleges that the control computer 38 identified as the pre-switch merely routes data to a slave on a particular path. Paper 2., 49-55. This again is distinct from routing data through one or more daisy chains (i.e., selecting one of several daisy chains). Indeed, I note that the Petition admits that Vink explicitly discloses that control computer 38 determines the routing of data packets *to the correct slave in the chain*: “Vink explains that ‘the control computer 38 provides for and monitors the correct sequence of the data bits for a relevant slave, related to the sequence in which the I/O modules are arranged.’ . . . In other words, the control computer 38 determines the routing of data packets to the correct slave unit based on where the I/O modules are located in the daisy chain.” Pet., 49-50.

94. In the event of a fault, the Petition also admits that Vink discloses that control computer 38 reverses the direction of data flow (i.e., data flows in the opposite direction) rather than routes the data through another daisy chain as claimed. Pet., 50 (“Vink also discloses that data packets are re-routed in the event of a fault at a location in one of the daisy chains (e.g., switch direction of data flow).

See Ex. 1005, 14:28-34 (‘A very flexible system is obtained ... 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 constructed in this way are capable of functioning as a switching centre so that, for example, the master is able to reach as many connected slaves as possible in a fault situation.’); *id.*, 9:4-7 (“It is furthermore possible, in the event of malfunctions in the transmission system, for example during the switching of transmission or communication directions, nevertheless to exchange the correct data bits with the correct slave.”).

95. Additionally, while Vink teaches configurations with “more than two rings,” Vink does not teach routing data through one of several daisy chains. Even in a two-ring topology, a POSA would understand from Vink that, in the event of a fault, the data flow in a single ring is simply reversed. As Vink teaches that reversing the data flow resolves the fault, there is no need to further route data through more than one daisy chain. For that reason, there is no teaching in Vink to route data through a different daisy chain.

- E. Vink, Patrick, and AAPA do not suggest “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” (Claims 6, 20, and 23)**

96. Claim 6 requires “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.” The same “bicast” limitation is also found in claim 23.

97. A POSA would understand that the word “bicast,” in the context of “the first master unit bicast the upstream data packets...to the network” and “the first master unit bicast the upstream data packets...to the second master unit, which transmits the upstream data packets to the network” refers to a built-in redundancy in which the first master unit conveys the same upstream data (1) directly to the external network and (2) to the second master unit, which then also conveys the upstream data to the external network. In other words, claims 6 and 23 recite a redundant process in which *the same* upstream data is conveyed to the external network *twice*—once directly by the first master unit and once indirectly by the first master unit by way of the second master unit.

98. Claim 20 recites a similar requirement in reverse. Claim 19 requires the master to convey downstream packets “along the daisy chain in a first direction.” Then, claim 20 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. Thus, claim 20, like claims 6 and 23, recite a

redundant process in which the same downstream packet is conveyed to a particular slave twice, in both directions of the daisy chain via two different masters.

99. In my opinion, the Petition and Dr. Houh's declaration do not support Vink disclosing the two-step process required by claims 6, 20, and 23. Indeed, nothing in Vink suggests this two-step process.

100. First, Dr. Houh identifies only teachings in which Vink's master allegedly transmits upstream packets to the network or transmit upstream packets to a second master for transmission to a network. Ex. 1003, ¶¶167-170. But even if Vink's master were able to transmit upstream packets to a network and able to transmit upstream packets to a second master, that does not mean that the master performs both steps for the same upstream data. For the same reasons, Vink does not disclose that its master redundantly transmits downstream packets as in claim 20 (i.e., to both the slaves and the second master to the slaves).

101. Furthermore, a POSA would understand that Vink actually deters "bicasting" data as claimed. Vink discloses that in its multi-master concept, there is *one* active master while the other masters are passive. Ex. 1005, 16:19-17:2. In the event of a fault, one of the passive masters assumes the functions of the active master:

In such a multi-master concept, ***one of*** the masters is in general active in relation to data exchange, while one or more other masters only have a passive role therein. All the masters are so designed that they can assume the function of the active master, for example in the event of faults. The passive masters are easily able to detect errors of the active master because, as a consequence of their cascade arrangement and the serial transfer of data bits in the communication system according to the invention, they receive all the information which is intended for the active master. Consequently, no separate communication path is required between the various masters to keep the passive masters abreast of the operations, instruction etc. carried out by the active master. Such a “hot stand-by” mode is of importance, in particular, in industrial process measurement and control in which failure or delay in the production process may, inter alia, have serious financial consequences. It is obvious that, in such a multi-master concept, the conditions under which, and the manner in which, the tasks of a master are assumed by another master have to be specified in advance.

Id.

102. Based on these disclosures, a POSA would understand that Vink’s invention employs the second, passive master as the point of redundancy, as it steps in or assumes the role of the active master in the event of a fault. Since Vink teaches that there is only ever one active master, there is no need for Vink’s system to utilize

two separate transmission paths when the purpose of the passive masters is to assume the role of the active master.

103. I understand that Dr. Houh and the Petition also rely on AAPA disclosing the 1+1 Automatic Protection Switching technique. Ex. 1001, 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.”).

104. First, the 1+1 Automatic Protection Switching technique is only discussed in connection with bicasting packets from the active masters to the network. *Id.*, (“The 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.”). This disclosure does not implicate claim 20’s requirement that packets received from the network passed from the first masters to the slaves and also from the first master to the second master to the slaves.

105. Second, even if this redundancy was known in the art, a POSA would not apply this redundancy to Vink as Vink deters bicasting for the reasons above.

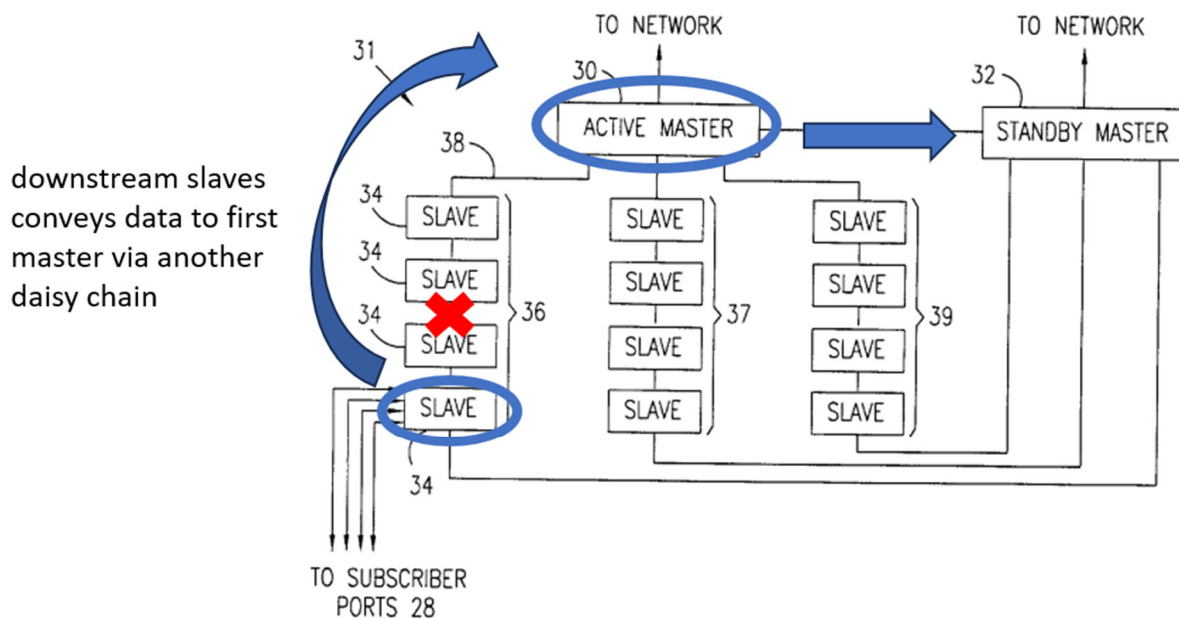
106. Third, the '904 Patent does not state that the specific redundancy in transmission in claims 6 and 23 are disclosed by or the same as the standard "1+1 APS" (automatic protection switching) technique. Rather, the '904 Patent states that the redundancy in transmission is consistent with the standard "1+1 APS" (automatic protection switching) technique. A POSA would understand that "1+1 APS" refers to the same source (i.e., a master) providing two copies the same transmission generally (*see* <https://info.support.huawei.com/info-finder/encyclopedia/en/APS+Protection.html>) and is not a specific teaching for a first master to provide the same upstream data to the network and to a second master.

107. For these reasons, it would not have been obvious to bicast upstream data as claimed in view of Vink.

F. Vink, Patrick, and AAPA do not suggest "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" (Claim 8)

108. Claim 8 requires, in the case of a fault, "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." 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



109. The Petition alleges and Dr. Houh opines that the discussion of claims 7 and 9 renders claim 8 obvious: “The discussions I provided above in Sections VIII.A.3.ix [9f] and VIII.A.6.ii [7a] apply equally to how Vink in combination with Patrick renders obvious limitation [8a].” Ex. 1003, ¶176, Pet. 76.

110. I disagree. Even if the direction of data flow was reversed such that data was passed from the last slave unit in the daisy chain to the second master unit as in claim 7, that does not satisfy the flow of data required by claim 8. In claim 7, the flow of data is reversed in a single daisy chain *and reaches the second master*

before the first master. Claim 9 by contrast requires the flow of data to pass through another daisy chain, reach the first master first, and then the first master passes the data to the second master. Similarly, even if data was rerouted from one daisy chain to another daisy chain as in claim 9, reversing the flow of data would still result in the second master receiving the data from the slave via the faulty daisy chain, not from the slave via the first master and another daisy chain. In this way, claim 8 describes a separate fault protection technique that is distinct from the procedures of claims 7 and 9.

111. Based on Vink's disclosures, a POSA would understand that Vink's solution in the context of a fault in the cascade connection between Vink's active and passive masters would be to reverse the direction of data flow, thereby allowing the downstream packets from the slave to reach the second master along the faulty daisy chain. Given that Vink already teaches this solution, a POSA would have no reason to implement the entirely different procedure of claim 8 in which the affected slave routes the data through another daisy chain to the first master before reaching the second master.

- G. Vink, Patrick, and AAPA do not suggest “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” (Claim 17)**

112. Claim 17 requires “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.” Further, claim 17 requires that “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.”

113. The Petition states that Vink discloses these limitations for the reasons “explained in Sections VI.B.1.j [11d], VI.B.1.l [11f], and VI.B.9.d [14c] [for claims 11 and 14].” Pet., 89. Dr. Houh opines that his discussion of claims 11 and 14 “apply equally to how Vink discloses limitation [17a].” Ex. 1003, ¶206.

114. In my opinion, Vink does not disclose a multicast packet. In my opinion, Vink also does not disclose the pre-switch retaining a copy of a packet and passing on another copy of the packet as claimed. In my review of Vink, I cannot identify any disclosure that suggests a multicast packet that is both retained by a pre-switch and passed on as in claim 17. This element is simply missing from Vink.

115. Nothing in either the Petition’s or Dr. Houh’s discussion of claims 11 and 14 explains why Vink discloses retaining a copy of a multicast packet and passing a copy of the multicast packet to succeeding units in the daisy chain.

116. The Petition's and Dr. Houh's discussion of element [11d] is a description of the slave units with no discussion of multicast packets or their treatment. Paper 2, 56; Ex. 1003, ¶143.

117. The Petition's and Dr. Houh's discussion of element [11f] discusses components of Vink's slave unit (transmitting/receiving unit 6, control module 9, and I/O module 10), including those alleged to be the claimed pre-switch. Dr. Houh's declaration states that the alleged pre-switch either retains data packets addressed to the ports or passes data packets addressed to other slaves onto the other slaves through the next transmission lines. Ex. 1003, ¶¶155-158. Nothing in Dr. Houh's testimony suggests the same packet is both retained and passed along, and in my review of Vink I cannot identify any disclosure that suggests this. In fact, Dr. Houh's characterization of Vink as "retain[ing] only the data packets addressed to the I/O modules within it, as determined by the transmitting/receiving unit 6 and control module 9" and the Petition's characterization of Vink as "retain[ing] only data packets addressed to the ports (e.g., output 33) of any I/O module 10 of the particular slave, while passing data packets addressed to other slaves onto the other slaves through the next transmission lines 7, 8" are consistent with my opinion that Vink does not teach a multi-cast packet that is both retained and passed.

118. The Petition's and Dr. Houh's discussion of element [14c] simply refers back to [11d] and [11f]. Ex. 1003, ¶198. Thus, in my view, nothing in the Petition or Dr. Houh's declaration establishes that Vink discloses retaining a copy of a multicast packet and passing a copy of the multicast packet to succeeding units in the daisy chain as in claim 17.

VIII. CONCLUSION

119. I hereby declare that all statements made herein of my own knowledge are true and all statements made herein on information and belief were and are believed by me to be true, and that all statements herein were and are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that any such willful false statements may jeopardize the validity of the application or any patents issued thereon.

Respectfully submitted,



Miguel Gomez

Dated: February 12, 2024