

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

UNIFIED PATENTS, LLC
Petitioner

v.

COMPETITIVE ACCESS SYSTEMS, INC.
Patent Owner

Case No. IPR2023-00584
U.S. Patent 10,868,908

DECLARATION OF JAMES GEIER

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I. BACKGROUND AND QUALIFICATIONS

1. My name is James Geier, and I am over 21 years and otherwise competent to make this Declaration. I make this Declaration based on facts and matters within my own knowledge and on information provided to me by others, and, if called as a witness, I could and would competently testify to the matters set forth herein.

2. I have been retained as a technical expert witness in this matter by Counsel for the Petitioner, Unified Patents, LLC (“Petitioner”) to provide my independent opinions on certain issues requested by Counsel for Petitioner relating to the accompanying Petition for *Inter Partes* Review of U.S. Patent No. 10,868,908 (“the ’908 Patent”), challenging Claims 1–3, 5, 6, and 13–15 (the “Challenged Claims”). My compensation in this matter is not based on the substance of my opinions or on the outcome of this matter. I have been informed that Competitive Access Systems, Inc. (“Patent Owner”) is the purported owner of the ’908 Patent. I note that I have no financial interest in Petitioner or Patent Owner, and I have no other interest in the outcome of this matter.

3. I have over 30 years of industry experience, including a substantial portion of which was spent working with communications systems, including systems involving wireless and multipath communications. I have summarized in this section my educational background, career history, and other qualifications

relevant to this matter. I have also included a current version of my curriculum vitae as Appendix A to this declaration.

4. I received a B.S. degree in Electrical Engineering from California State University in 1985. In 1990, I received an M.S. degree in Electrical Engineering from the Air Force Institute of Technology.

5. In my commercial experience, I have designed and implemented various network systems, including an enterprise-wide Ethernet/IEEE 802.3 network to support client-server systems and middleware software for improving the performance between mobile wireless devices and application servers. Integrating new ports into conventional devices, such as integrating ethernet, Wi-Fi, Bluetooth, cellular, and USB transceivers into mobile devices such as phones, monitors, cable T.V. boxes, bar code scanners, and wireless printers. I have also designed large-scale wireless networks for municipalities, hospitals, airports, and manufacturing facilities for supporting voice, video, and data applications.

6. I have also authored over a dozen books on mobile and wireless topics, including Designing and Deploying 802.11 Wireless Networks (Cisco Press), Implementing 802.1X Security Solutions (Wiley), Wireless Networking Handbook (New Riders) and Network Re-engineering (McGraw-Hill). I have been an active participant within standards organizations, such as the IEEE 802.11 Working Group and the Wi-Fi Alliance. I have served as Chairman of the IEEE Computer Society,

Dayton Section, and various conferences.

7. As part of my work in forming my opinions in connection with this proceeding, I have reviewed the following materials, which I believe those in the field would reasonably rely upon in forming opinions regarding the subject matter of this proceeding:

Exhibit ¹	Description
1001	U.S. Patent 10,868,908 (the “’908 Patent”)
1002	File History for U.S. Patent 10,868,908
1004	U.S. Patent 6,160,808 to Maurya (“Maurya”)
1005	International Publication WO 97/22212 to Low <i>et al.</i> (“Low”)
1006	U.S. Patent 5,809,070 to Krishnan <i>et al.</i> (“Krishnan”)
1007	U.S. Patent 7,606,156 to DeLangis (“DeLangis-156”)
1008	File History for U.S. Application 13/531,294
1009	U.S. Patent 8,861,349 to DeLangis
1010	Neil Briscoe, <i>Understanding the OSI 7-Layer Model</i> , PC Network Advisor, Issue 120, pp. 13-14 (Jul. 2000) (“Briscoe”)
1011	John D. Day and Hubert Zimmerman, <i>The OSI Reference Model</i> , Proc. of the IEEE 71(12), 1334-1340 (Dec. 1983) (“Day”)
1012	W. Simpson, <i>The Point-to-Point Protocol</i> , Network Working Group, RFC 1661 (Jul. 1994), available at https://www.rfc-editor.org/rfc/rfc1661 (“Simpson”)
1013	U.S. Patent 6,112,245 to Araujo <i>et al.</i> (“Araujo”)
1014	U.S. Patent 5,774,660 to Brendel <i>et al.</i> (“Brendel”)

¹ For ease of reference, I cite to the exhibit page number provided at the bottom right of each exhibit that is not a patent or patent publication. This number corresponds to the PDF page number.

1015	K. Sklower, et al., <i>The PPP Multilink Protocol (MP)</i> , Network Working Group, RFC 1990 (Aug. 1996), available at https://www.rfc-editor.org/rfc/rfc1990.html (“Sklower”)
1016	U.S. Patent 7,315,900 to Ofelt <i>et al.</i> (“Ofelt”)
1017	Mel Beckman, <i>Integrated Services Digital Network Tutorial</i> , ARC Electronics (1995), available at https://arcelect.com/isdn.htm (“Beckman”)
1018	Lillian Goleniewski, Excerpt of <i>Telecommunications Essentials: The Complete Global Source for Communications Fundamentals, Data Networking and the Internet, and Next-Generation Networks</i> , Telecommunications Technology Fundamentals, Addison Wesley (Dec. 28, 2001), available at https://www.informit.com/articles/article.aspx?p=24687 (“Goleniewski”)

II. LEGAL FRAMEWORK

A. Obviousness

8. I am a technical expert and do not offer any legal opinions. However, I have been informed about certain legal principles regarding patentability and related matters under United States patent law, which I have applied in performing my analysis and arriving at my technical opinions in this matter.

i. General Framework

9. I am informed that a person cannot obtain a patent on an invention if the differences between the invention and the prior art are such that the subject matter as a whole would have been obvious to a person having ordinary skill in the art obvious at the time of the invention. I am informed that a conclusion of obviousness may be founded upon more than a single item of prior art. I am also informed that obviousness is determined by evaluating the following factors: (1) the scope and content of the prior art, (2) the differences between the prior art and the claim at issue, (3) the level of ordinary skill in the pertinent art, and (4) secondary considerations of non-obviousness. In addition, the obviousness inquiry should not be done in hindsight. Instead, the obviousness inquiry should be done through the eyes of a person having ordinary skill in the art at the time of the alleged invention.

10. In considering whether certain prior art renders a particular patent claim obvious, I am informed that one must consider the scope and content of the prior art,

examples of which include disclosures in patents, trade publications, journal articles, conference papers, industry standards, product literature and documentation, texts describing competitive technologies, requests for comment published by standard setting organizations, and materials from industry conferences.

11. I am informed that for a patent claim to be found obvious, the proper perspective to consider is that of a person having ordinary skill in the art (often referred to as a “PHOSITA,” “POSITA,” or “POSA”) at the time of the alleged invention. I am informed that the factors to consider in determining the level of ordinary skill in the art include (1) the educational level and experience of people working in the field at the time the invention was made, (2) the types of problems faced in the art and the solutions found to those problems, and (3) the sophistication of the technology in the field.

ii. Analogous Art

12. I am informed that for a prior art reference to be proper for use in an obviousness analysis, the reference must be “analogous art” to the claimed invention. I am informed that a reference is analogous art to the claimed invention if: (1) the reference is from the same field of endeavor as the claimed invention (even if it addresses a different problem); or (2) the reference is reasonably pertinent to one or more problems faced by the inventor (even if it is not in the same field of endeavor as the claimed invention). In order for a reference to be “reasonably

pertinent” to a problem, it must logically have commended itself to an inventor's attention in considering the problem. In determining whether a reference is reasonably pertinent, one should consider problems faced by the inventor, as reflected either explicitly or implicitly, in the specification. I believe that all of the references I considered in forming my opinions in this IPR are well within the range of references a person having ordinary skill in the art would have consulted by the time of the invention to address the type of problems described in the Challenged Claims.

iii. Combining Known Elements in the Art, Common Sense

13. I am informed that, in order to establish that a claimed invention was obvious based on a combination of prior art elements, a clear articulation of the reason(s) why a claimed invention would have been obvious must be provided. Specifically, I am informed that, under the U.S. Supreme Court’s KSR decision, a combination of multiple items of prior art renders a patent claim obvious when there was an apparent reason for a person having ordinary skill at the time of the invention to combine or modify the prior art. I am informed that such reason may include, but is not limited to, one or more of the following rationales: (A) combining prior art methods according to known methods to yield predictable results; (B) substituting one known element for another to obtain predictable results; (C) using a known technique to improve a similar device in the same way; (D) applying a known

technique to a known device ready for improvement to yield predictable results; (E) trying a finite number of identified, predictable potential solutions, with a reasonable expectation of success; (F) identifying that known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art; or (G) identifying an explicit teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine the prior art references to arrive at the claimed invention.

14. I am informed that the test for obviousness is not whether the features of a secondary reference may be *bodily incorporated* into the structure of the primary reference, but rather whether one of skill would have been motivated to combine the teachings of the prior art references to achieve the claimed invention. Nevertheless, I am informed that an invention that is a combination of prior art must do more than yield predictable results to be non-obvious and that, even where one or more motivations to combine exist, claims are not necessarily obvious unless a person having ordinary skill in the art would have had a reasonable expectation of success in implementing or applying the proposed combination at the time of the invention.

15. I also am informed that in conducting an obviousness analysis, a precise teaching directed to the specific subject matter of the challenged claim need not be

sought out because it is appropriate to take account of the inferences and creative steps that a person having ordinary skill in the art at the time of the invention would employ. In other words, the prior art need not be directed towards solving the same specific problem as the problem addressed by the patent. Further, the individual prior art references themselves need not all be directed towards solving the same problem. The prior art considered can be directed to any need or problem known in the field of endeavor at the time of invention and can provide a reason for combining the elements of the prior art in the manner claimed. Common sense teaches that familiar items may have obvious uses beyond their primary purposes, and a person having ordinary skill in the art will often have been able to fit the teachings of multiple prior art references like pieces of a puzzle. I am informed that, under the *KSR* standard, common sense is important and should be considered in assessing obviousness.

16. I also am informed that the fact that a particular combination of prior art elements was “obvious to try” may indicate that the combination was obvious even if no one attempted the combination. If the combination was obvious to try (regardless of whether it was actually tried) or leads to anticipated success, then it is likely the result of ordinary skill and common sense rather than innovation. I am further informed that in many fields it may be that there is little discussion of obvious techniques or combinations, and it often may be the case that market demand, rather than scientific literature or knowledge, will drive the design of an innovation. When

there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person having ordinary skill in the art has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation, but of ordinary skill and common sense.

iv. Teaching Away

17. I am informed that it is improper to combine references where the references teach away from their combination. I am informed that a reference may be said to teach away when a person of skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the patent applicant. In general, a reference will teach away if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the patentee. I am informed that a reference teaches away, for example, if (1) the combination would produce a seemingly inoperative device, or (2) the references leave the impression that the product would not have the property sought by the patentee. However, I am informed that a reference does not teach away if it merely expresses a general preference for an alternative invention but does not criticize, discredit, or otherwise discourage investigation into the invention claimed. Further, a person of skill will often appreciate that different courses of action often have

simultaneous advantages and disadvantages, and I am informed the existence of such does not necessarily obviate a motivation to combine.

v. **Secondary Considerations**

18. I am informed that even if a *prima facie* case of obviousness is established, the final determination of obviousness must also consider “secondary considerations” if presented. I am informed that in most instances, the patentee raises these secondary considerations of non-obviousness. In that context, the patentee argues an invention would not have been obvious in view of these considerations, which include: (a) commercial success of a product due to the merits of the claimed invention; (b) a long-felt, but unsatisfied need for the invention; (c) failure of others to find the solution provided by the claimed invention; (d) deliberate copying of the invention by others; (e) unexpected results achieved by the invention; (f) praise of the invention by others skilled in the art; (g) lack of independent simultaneous invention within a comparatively short space of time; (h) teaching away from the invention in the prior art.

19. I am further informed that secondary-considerations evidence is only relevant if the offering party establishes a connection, or nexus, between the evidence and the claimed invention. The nexus cannot be based on prior art features. For example, if commercial success of products allegedly embodying the claims is presented as a secondary indicium of non-obviousness, the patent owner must show

that such success is due to features of the claimed invention, and not features unrelated to the claimed invention or that already existed in the prior art. The establishment of a nexus is a question of fact. While I understand that the Patent Owner here has not offered any secondary considerations at this time, I will supplement my opinions in the event that Patent Owner raises secondary considerations during the course of this proceeding.

B. Claim Construction

20. I am informed that in performing an obviousness analysis, it is necessary to understand the scope of the claims. I am also informed the first step in an unpatentability analysis, therefore, involves construing the claims. Second, the construed claim language is then compared to the disclosures of the prior art. I am informed that claim terms need only be construed to the extent necessary to resolve the ultimate question of obviousness.

21. I am informed that claims are generally given their ordinary and custom meaning as understood by one of ordinary skill in the art at the time of the invention, in light of the patent specification. I am informed that, for the purposes of claim construction, while expert testimony may be helpful to provide background on the technology at issue, to explain how an invention works, to ensure an understanding of the technical aspects of the patent is consistent with that of a person having ordinary skill in the art, or to establish that a particular term in the patent had a

particular meaning in the pertinent field at the time of the invention. However, I am also informed testimony from a technical expert is generally less reliable than the patent itself and its prosecution history in determining the meaning of claim terms, and it is not the role of technical experts to supplant courts and PTAB judges in applying principles of claim interpretation. However, the “Background of the Technology” that I provide in Section III.C of my opinion sheds light on background on the technology at issue in this proceeding and, hopefully, provides the adjudicators with an understanding of certain pertinent technical aspects that a person having ordinary skill in the art would have appreciated by the time of the ’908 Patent.

22. For this proceeding, I have applied the claim construction set forth in Section II.E of the IPR Petition that this declaration accompanies when analyzing the prior art and the claims. First, I have been instructed to assume that the word “and” is missing from following limitations of Claim 1 of the ’908 Patent: *the first message includes a multilink request [and] a destination URL; the second message includes a multilink session identification [and] the destination URL*. However, I note that my opinions regarding the ultimate issue of patentability remain the same even if the word “or” was meant to be used in Claim 1.

23. I have also been instructed on certain elements of claim 13, discussed at Section IV.B.3 of the Petition. First, I have been instructed that in limitation

13.2.3, which recites *receive the different data packets through the at least one network interface from the second device and from the third device during the multilink session, wherein the data transfer rate associated with the network interface to the second device and the network interface to the third device provide an increased data transfer rate for the first device* refers to “the different data packets” for the first time. I am informed that patent claim terms following words such as “the” and “said” generally should have antecedent basis earlier in a claim. Thus, I have been instructed to assume that this word “the” should have been omitted, as indicated in Section IV.B.3 of the Petition (limitation 13.2.3 analysis).

24. Claim 13 uses different articles to refer to a network interface to the second and third devices, making it is unclear as to whether whether the same network interface must be used to connect a first device to second and third devices or if two different network interfaces may be used. Petition, Section IV.B.3 (limitation 13.2.1 and 13.2.2 analysis). Some limitations refer to *a network interface* (13.1), and then transmitting a first message *through the network interface* to the second device (13.2.1) and a second message *through the network interface* to a third device (13.2.2). These limitations also each refer to *the network interface to the [second/third] device having a data transfer rate associated therewith*. And other limitations refers to *the at least one network interface* (13.2.3) and *the data transfer rate associated with the network interface to the second device and network*

interface to the third device (13.2.4). Therefore, I discuss alternative embodiments of Krishnan supporting the combination of Maurya, Krishnan, and Low that would satisfy either possibility of one or two network interfaces being required by claim 13 and motivations to combine for each.

25. Finally, regarding the final limitation of claim 13 (limitation 13.2.4), although it does not indicate what the “increased data rate for the first device” is to be compared against, given the context referring to multilink communications earlier in the claim, I have been instructed to assume that the *increased data rate* refers to the combined bandwidth provided by using the second and third devices to transmit different segments of a transfer of information, such as a file, which appears consistent with the specification. *'908 Patent* (EX1001), 11:50-53.

26. For those terms not expressly construed, counsel has not instructed me to apply a construction of the claims notwithstanding their ordinary meaning. Therefore, I have applied the meaning of the claim terms of the Challenged Claims that is generally consistent with the terms’ ordinary and customary meaning, as a person having ordinary skill in the art would have understood them in the context of the *'908 Patent* at the time of the alleged invention.

III. OPINION

A. Summary of My Opinions

27. In forming my opinions below, I have reviewed the '908 Patent, the file history of the '908 Patent, the scope of the prior art discussed herein and in the Petition, and I have considered the knowledge and skill a person of ordinary skill in the art would have had by the time of the priority date of the '908 Patent. If Patent Owner submits additional evidence pertaining to the patentability of the '908 Patent, I intend to review such materials and update my analysis and conclusions as appropriate and as permitted under the rules of this proceeding.

28. I have also relied on my education, experience, and knowledge in the relevant field of art in forming my opinions expressed below. The “Background of Technology” that I provide in Section III.C sheds light on the background of the technology at issue in this proceeding and, hopefully, will provide the adjudicators with an understanding of certain technical aspects that are pertinent to this proceeding. In my opinion, the cited contents accurately reflect the general knowledge that a POSA would have had by October 15, 2002, and certainly later if a different priority date is assigned to the '908 Patent. I note that this background is not exhaustive—a POSA would have been familiar with many of the facets of multilink communication systems that are not described, but I have endeavored to touch on concepts relevant to the technology claimed.

29. I've also reviewed the Petition's explanation as to why the Challenged Claims are unpatentable, including based on the technical background I provide here, and contributed to the arguments presented in the Petition. I agree with the Petition's explanation as to how the prior art teaches the limitations of the challenged claims.

B. Level of Skill of a Person Having Ordinary Skill in the Art

30. I was asked to provide my opinion as to the level of skill of a person having ordinary skill in the field of the '908 Patent at the time of the claimed invention (referred to herein as a "POSA"). I have been instructed to assume is that the time of the claimed invention of the '908 Patent is October 15, 2002; however, I note that if a later priority date is applied to the Challenged Claims, this person would still have all of the skill and knowledge described in my background below. In determining the characteristics of a POSA, I was told to consider several factors, including the type of problems encountered in the art, the solutions to those problems, the rapidity with which innovations are made in the field, the sophistication of the technology, and the education level of active workers in the field. I also placed myself back in the time frame of the claimed invention and considered the colleagues with whom I had worked at that time.

31. In my opinion, a POSA would have been a person having, as of the priority date of the '908 Patent (1) at least an undergraduate degree in electrical

engineering or closely related field, or similar advanced pose-graduate education in this area; and (2) 2 or more years of experience with communications systems, with more experience substituting for less education and vice versa, with more experience substituting for less education and vice versa. Such a person of ordinary skill in the art would have been capable of understanding the '908 Patent and the prior art references discussed herein.

32. Based on my education, training, and professional experience in the field of the claimed invention, I am familiar with the level and abilities of a POSA. Additionally, I met at least these minimum qualifications at least as of October 15, 2002. Further, although my qualifications may exceed those of the hypothetical person defined above, my analysis and opinions regarding the '908 Patent have been rendered from the perspective of a POSA during the relevant time frame. Again, I note that if a later priority date were applied to the claims, the POSA would have at least possessed the knowledge and skill presented below, and likely more as technology and resources became more widely available.

C. Background of the Technology

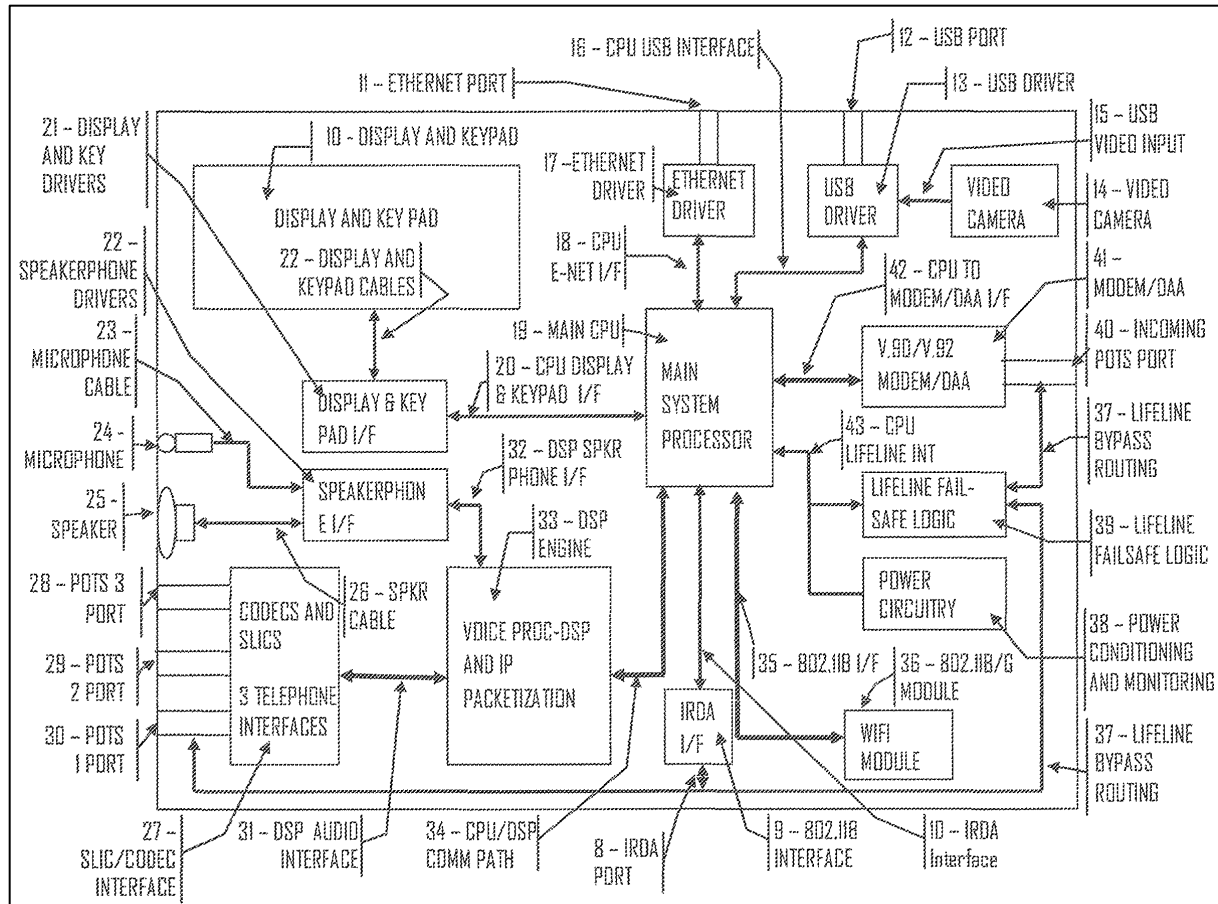
33. The '908 Patent relates to a communications gateway, or RCG, for use in, for example, a home or small office, that “combines the capabilities of IP routers,

Class 5² circuit switches and wireless LANs” that is capable of providing additional services over a Plain Old Telephone Service (POTS) line. ’908 *Patent* (EX1001), 2:36-40. The RCG purports to provide “new calling features and services over the existing POTS line” not offered by existing local exchange companies without requiring new infrastructure (such as cable or DSL). *Id.*, 1:40-2:6.³

34. The RCG is plugged into POTS line and includes three line-output jacks to provide additional telephone lines into the household or office. *Id.*, 2:54-60; *see also* 2:48-53. Additional interfaces, such as a Universal Serial Bus (USB) or Ethernet port and 802.11b/g interface, are included for computer connectivity if data communications are desired. *Id.*, 2:60-3:1. For example, Figure 1 shows the internal interfaces that could be provided in the RCG:

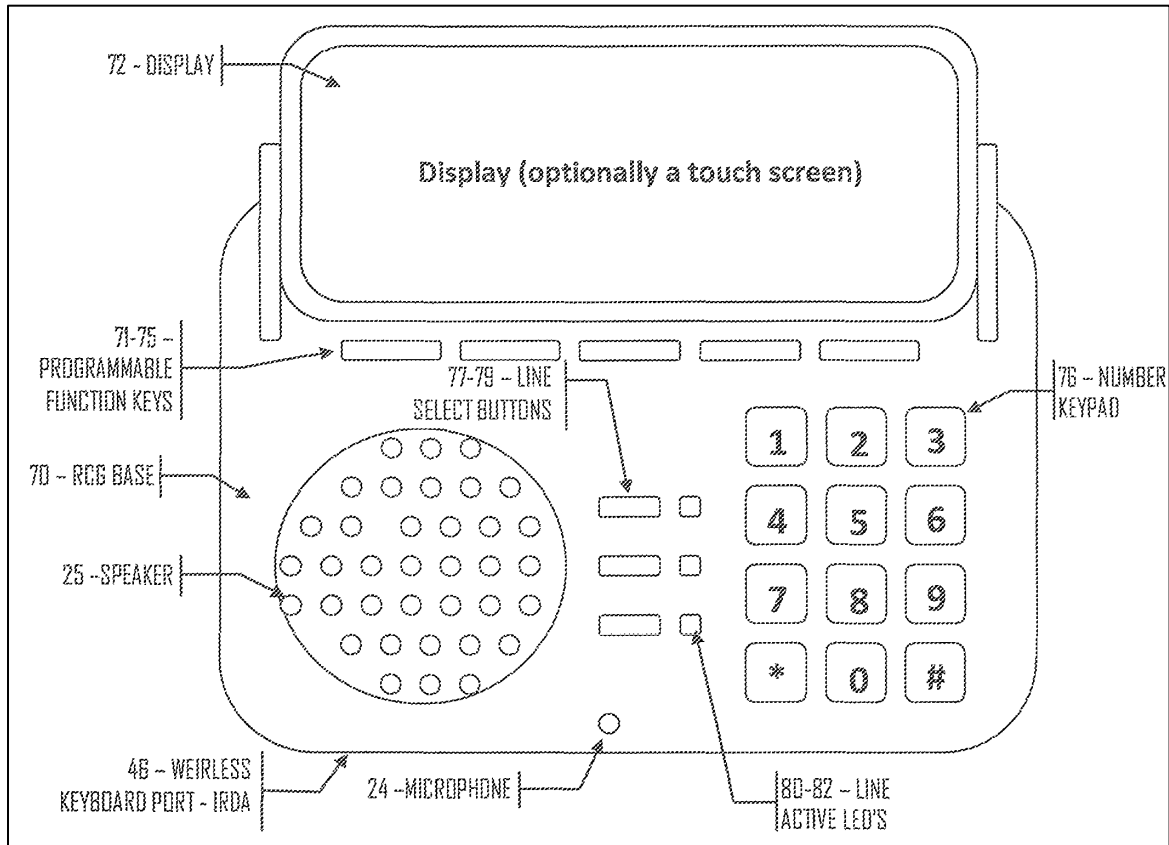
² A “class 5” telephone switch refers to an exchange in the public switched telephone network that directly provides services to subscribers, and it was also known as the “local exchange” or the “central office.” *See Goleniewski* (EX1018), 3.

³ While the Abstract of the ’908 Patent identifies a general “network-edge router,” such as “cellular device or tower,” the specification never otherwise uses these terms, nor does the specification of, for example, DeLangis-156 or another parent patent, U.S. Patent 8,861,349.



Id., Fig. 1.

35. The RCG is a “small stand-alone external modem like device.” *Id.*, 2:36-38. It is plugged into the POTS to provide additional phone lines in its “simplest and most basic usage,” but it may also be connected to a computer for data communications, such as through an Ethernet or USB port. *Id.*, 2:56-65. An 802.11b/g interface may the RCG to communicate wirelessly with other computers. Figure 4 illustrates an example embodiment of an RCG that includes a speakerphone and display:



Id., Fig. 4.

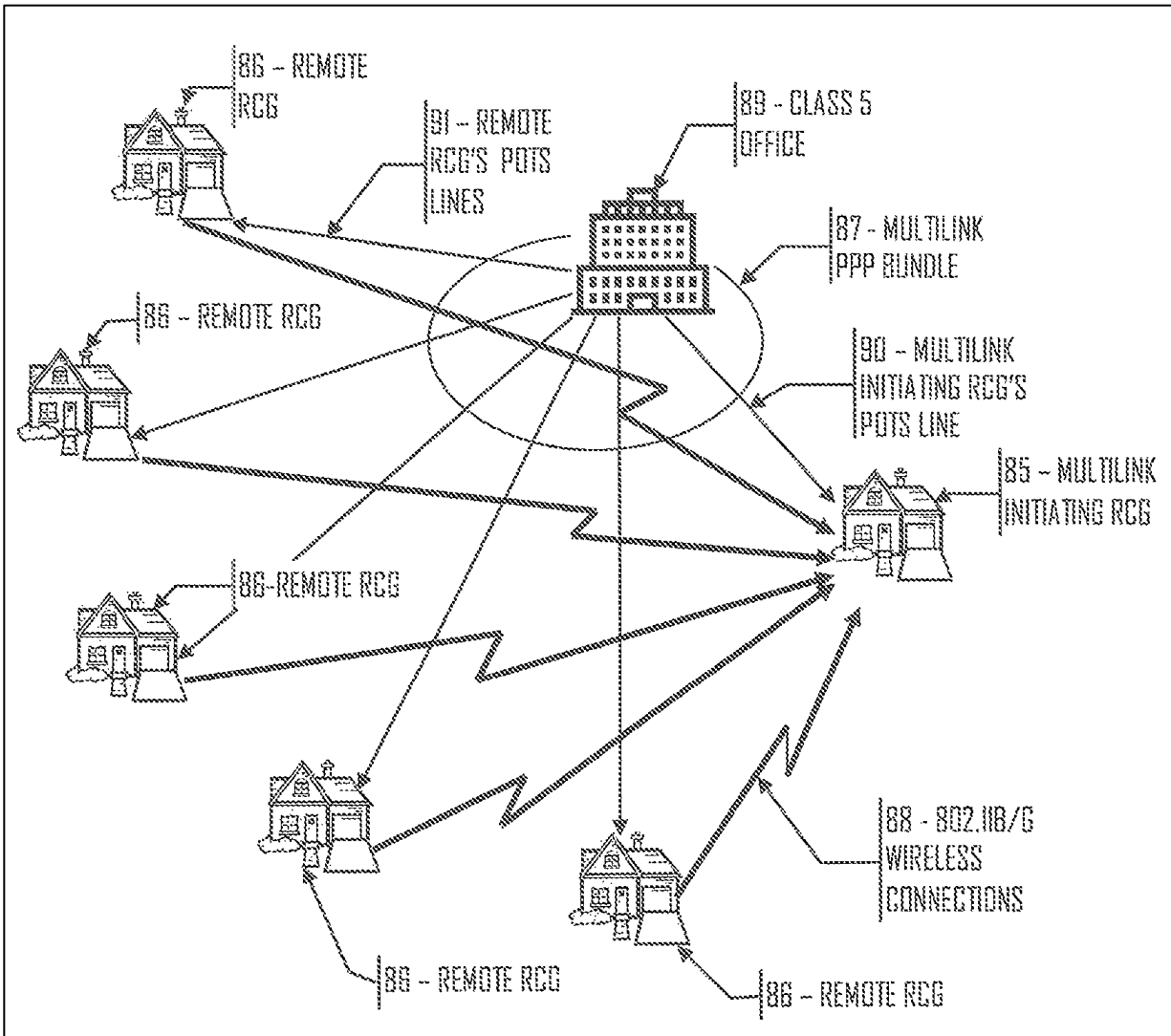
36. In one embodiment, the '908 Patent describes that the RCG “implements broadband over POTS by employing an 802.11 b/g to configure a multilink PPP bundle—87 (per RFC 1990) comprised of the POTS lines” of other RCGs. *Id.*, 11:25-28. The point-to-point protocol (“MLPPP”), also known as the multilink protocol (“MP”) was a well-known implementation of the point-to-point protocol. By RFC 1990, I presume the applicant was referring to Sklower (Exhibit 1015), which a POSA certainly would have been familiar with when dealing with multilink communications by 2002. Additionally, a POSA would have been familiar with the broader point-to-point protocol, such as described in RFC 1661. I discuss

the multilink protocol in more detail in Section III.C.iii below.

37. In the multilink embodiment, the link is established by negotiating parameters with a “remote computer i.e. internet URL” through Link Control Protocol (LCP) session management. *Id.*, 12:2-9; *see also* Fig. 7. As part of a successful setup, the RCG receives a “multilink PPP session ID, or ‘magic number’” to identify the session and add or remove links from the multilink bundle. *Id.*, 12:9-14.

38. The RCG then selects remote RCGs for transferring data to the requesting device based on a desired transfer bandwidth and the available bandwidth of the remote RCGs. *Id.*, 9:22-51. The initiating RCG sends the remote RCG an initialization packet containing the session ID and the destination URL for the transfer. *Id.*, 12:51-57. After receiving the initialization packet from the originating RCG, the remote RCGs send their own multilink packet to the destination URL with the session ID and a request to be added to the bundle. *Id.*, 12:60-63. Then, “the destination URL accepts the request of each of the remote RCGs” and begins sending data packets to each RCG. *Id.*, 12:63-66. The remote RCGs relay the data to the initiating RCG, which will be responsible for reassembling packets. *Id.*, 12:66-13:7.

39. Figure 7 purports to illustrate the multilink communication arrangement.



Id., Fig. 7. Each RCG represents a logical link in the in the initiating RCG's multilink PPP bundle. *Id.*, 12:57-60. The destination URL/remote server computer is not shown. *Id.*, 12:6-8.

i. Background of Communication Layers

40. For two devices to communicate, the data must be sent and packaged in a particular way—devices communicating directly with one another must agree on the protocols being used, and if those devices are not compatible, specialized

programming or devices must be used to make the communications compatible. Most (if not all) networked communications rely on what are referred to as “layers” of the communication system to work properly. The industry standard model for communications layers is the Open System Interconnection, or “OSI” reference model. *See Briscoe* (EX1010), 1. The OSI model has seven layers. Other common systems, such as TCP/IP, may refer to fewer layers, but understanding the seven layers of the OSI model is still a helpful teaching tool to understand these other systems. *Id.*

41. Layer 1 is the “Physical Layer.” *Id.* When communicating using computers on the OSI model, the devices are passing strings of data using electrical, optical, magnetic, electromagnetic, or some other type of signal. *Id.*, 1. The smallest unit of these strings of data is a bit, which can have one or two states, 0 or 1. *Id.* represented by voltage, current, or wave. *Id.* The physical layer refers to the devices and interfaces that pass and store data, such as network interface controllers (NIC), wires, router interfaces, and flip flops in memory devices. All network devices physically communicate through a physical layer.

42. Layer 2 is the “Data Link Layer.” *Id.* The data link layer defines the access strategy for sharing the media stored on the physical medium. *Id.* The point-to-point protocol, including the MLPPP, operates at the data link layer. *Id.* The data link layer provides the functional and procedural means for data transfer itself

between network elements. *See, e.g., Day* (EX1011), 6. In other words, the data link layer provides functions such as network device addressing, data synchronization and error control.

43. Layer 3 is the “Network Layer.” *Briscoe* (EX1010), 1. The network layer provides a means for communicating open systems to establish, maintain, and terminate network connections. This is the layer at which the IP protocol is used. *Id.*, 1. The network layer handles the relaying and routing of data through one or more networks, and all routers operate at the network layer. *Id.*; *see also Day* (EX1011), 6.

44. Layer 4 is the “Transport Layer.” *Briscoe* (EX1010), 1–2. This layer ensures data reliability and integrity and may be implemented as software or specialized switching technology. *Id.*, 1–2. This is where the transmission control protocol, or TCP, operates. *Id.*, 1.

45. Layer 5 is the “Session Layer,” and it is this layer that prevents interference with communication between two devices by organizing and structuring the interactions between different application processes. *Id.*, 2; *see also Day* (EX1011), 5.

46. Layer 6 is the “Presentation Layer.” *Briscoe* (EX1010), 2. The presentation layer is where application data is packed or unpacked for use by a running application, and it includes steps like protocol conversions,

encryption/decryption, data compression/expansion. *Id.*

47. The final layer, layer 7, is the “Application Layer.” *Id.* This is where one would find the end-user and end-application protocols. *Id.*

48. When a packet of data is sent from one device to another, it “descends” the different layers, starting at a client application (for example) at layer 7, being wrapped in different headers and trailers, perhaps encrypted and compressed, as it goes through the different layers until, having reached the physical layer, it is sent across some medium to the destination device and “ascends” the layers, stripping unnecessary information and decrypting and expanding the original application data for the server application to process. *Id.*

ii. The Point-to-Point Protocol

49. The point-to-point protocol operates at the data link layer and the network layer. *See Simpson* (EX1012), 1. It includes a link control protocol (“LCP”) for establishing, configuring, and testing the data-link connection. *Id.* It also comprises a family of “network control protocols” (“NCPs”) for establishing and configuring different network-layer protocols, primarily to minimize issues in interacting with other network protocols. *Id.*, 3–4; *see also Araujo* (EX1013), 1:33-43.

50. A Uniform Resource Locator, or URL, identifies a domain, a host within that domain, and sometimes a resource or file within a directory structure on

the host computer (e.g., an html resource). *Brendel* (EX1014), 1:37-39. For example, the domain “ibm.com” identifies a domain for the company IBM, which may include “thousands” of individual server computers. *Id.*, 1:39-43. When a user clicks on or types in a URL into a browser, the host name (e.g., “www.ibm.com”) will be extracted from the URL and sent to a domain-name-system (DNS) server, which looks up (or requests another DNS server to look up) the physical IP address for the web-server host in the domain. *Id.*, 2:18-35. The client browser can then use this IP address to initiate a communication session with the remote computer that physically has the needed resource. *Id.*, 2:36-43. Once the session is initiated, the client sends the URL to the server. *Id.*, 2:44-47.

51. Because the LCP packets in the point-to-point protocol operate at the data link layer, whether a “destination URL” is included in a packet depends on what information is compiled by the upper layers of the communication model or protocol suite and the information requested by the transmitting device. For example, when a person types a URL into their browser (or clicks on a link), the web browser will create a request and tells the lower-layer stacks (such as the network and transport layers) to send the request to, for example, “google.com,” and the data-link layer will wrap these “datagrams” according to the protocol(s) being used and send it over the physical link to the intended recipient. *See, e.g., Araujo* (EX1013), 1:32-61; *see also Sklower* (EX1015), 7 (in the multilink protocol, network protocol packets are

encapsulated according to point-to-point procedures in the multilink protocol).

52. As discussed in more detail below regarding Low, a URL was a common, but not the only way to reach a server or identify a URL resource; for example, a uniform resource name (URN) that can be resolved into a URL may be used. *Low* (EX1005), 18:6-7. Therefore, while a POSA would appreciate that a destination URL may commonly have been included in the overall message to the recipient (such as a URL requested by a client executing a web browser application), it would not be the subject of the LCP configuration fields discussed in, for example, Maurya, and it would not inherently be included in an LCP configuration request to any server.

iii. The Multilink Protocol

53. The point-to-point multilink protocol, often referred to using the abbreviations MP, MLPPP, or ML-PPP, is a method of splitting, recombining, and sequencing datagrams across multiple logical data links. *Sklower* (EX1015), 1. First proposed in 1994 (RFC 1717), the multilink protocol had the advantage of providing users with greater additional “bandwidth on demand.” *Id.*, 2. Because of this greater bandwidth, and as the ’908 Patent itself recognizes, one feature a user would expect from employing devices capable of using multiple simultaneous channels and the multilink protocol is greater transmission rates. *See, e.g., ’908 Patent* (EX1001), 11:50-56.

54. The '908 Patent refers to the term “magic number” as a “session” identification. '908 Patent (EX1001), 12:9-14. Magic numbers were known to be used both as an error checking tool to prevent loopedback communications and as a type of endpoint identifier to add links to a multilink bundle as part of specific LCP configuration requests. *See generally Simpson* (EX1012) (RFC related to PPP); *Sklower* (EX1015) (RFC related to the multilink point-to-point protocol, describing the use of a magic number as an endpoint discriminator, or identifier); *see also '908 Patent* (EX1001), 12:11-14, 12:51-57 (multilink session identifier used for adding and removing devices from the multilink bundle).

55. For the multilink protocol, no magic number is negotiated as a default, and a zero is inserted where the magic number might have been in certain requests. *Simpson* (EX1012), 47; *see also Sklower* (EX1015), 5 (magic number not used for error checking as a default in the multilink protocol). However, if one is desired, an implementer first negotiates a magic number with its peer by sending a request with its own magic number; if it receives an identical magic number back from its peer, such indicates that the link is looped back, and a new one should be sent in a new Configure Request. *Simpson* (EX1012), 47–48. Otherwise, certain requests, such as Echo-Request, Echo-Reply, and Discard-Request packets, should always include the peer's Magic-Number field set to the negotiated Magic-Number. When peers negotiate a magic number, the Magic-Number of zero must always be responded to

with a negative acknowledgment (“nak’d”) or rejected outright. *Id.*, 48.

56. A magic number was generally known as an error-checking tool used to detect looped-back links. *Simpson* (EX1012), 47–48; *see also Sklower* (EX1015), 19. Reception of a magic number other than the negotiated number may also indicate a link that had been misconfigured for communications with a different peer, and this could be fixed by transmitting echo-request packets until an appropriate echo-reply is received. *Simpson* (EX1012), 47–48.

57. Magic numbers had other purposes as well. For example, if endpoint discriminators, also known as endpoint identifiers, were desired, this would be indicated by the number 19 in the “Type” field of a configuration request packet. *Sklower* (EX1015), 17. There were commonly five classes of addresses (other than the null class) for use as an endpoint discriminator, each with predictable advantages and disadvantages:

- 1 — Locally Assigned Address
- 2 — Internet Protocol (IP) Address
- 3 — IEEE 802.1 Globally Assigned MAC Address
- 4 — PPP Magic-Number Block
- 5 — Public Switched Network Directory Number

Sklower (EX1015), 17–18.

58. Thus, in the context of multilink point-to-point communications, the

use of magic numbers as an endpoint identifier address class was one of a few options, and although it was not necessarily preferred, it was permissible and well-known. *Sklower* (EX1015), 17, 19. The same magic number would be continuously used by the endpoint until the link was closed. *Id.*, 19. Magic numbers were preferably random numbers with a high probability of being a unique, such as by using a unique seed like a serial number or other hardware address along with some timing of an event, such as the timing of the arrival of a packet or a server response time. *Simpson* (EX1012), 47.

59. The use of additional identifiers for a multilink packet, such as through the use of an additional header or data to be included in the segment field, was well known prior to 2002, including in the context of point-to-point communications and multilink point-to-point communications. *See e.g., Araujo* (EX1013), 2:37-42 (disclosing a technique of using a session identifier in place of the high-level data link control address in establishing a point-to-point session); *see also Ofelt* (EX1016), 9:3-11, Fig. 8B (describing appending an additional multilink header that includes a bit field identifying a bundle associated with a data block to communications from a router).

60. For a split, or fragmented, data-carrying packet, certain header information would be used to so that the packet could be compiled properly at the receiving site. Specifically, each fragment would be assigned a sequence number

split into two fields. Using Maurya's long-sequence format as an example, the sequence number is a 24-bit value spread over two fields, with Field 535 including the first eight "significant bits" while Field 540 including the remaining sixteen bits. *Maurya* (EX1004), 10:48-51. The sequence number is incremented by one for each successive packet in the multi-link protocol so that the entire packet can be reordered upon reception. *Id.*, 10:54-58. Each sequence number would fall somewhere within the beginning sequence number and end sequence number (indicated by a different field in the header), so a receiver would be able to identify what the packet belonged to and where the packet fell.

D. The Combination of Maurya and Low

i. Overview of Maurya

61. Maurya relates to communications techniques using the multi-link protocol in systems where two endpoints, such as a client device and server, are associated with multiple incoming/outgoing links, such as Integrated Services Digital Network ("ISDN") basic rate interface ("BRI") terminals:

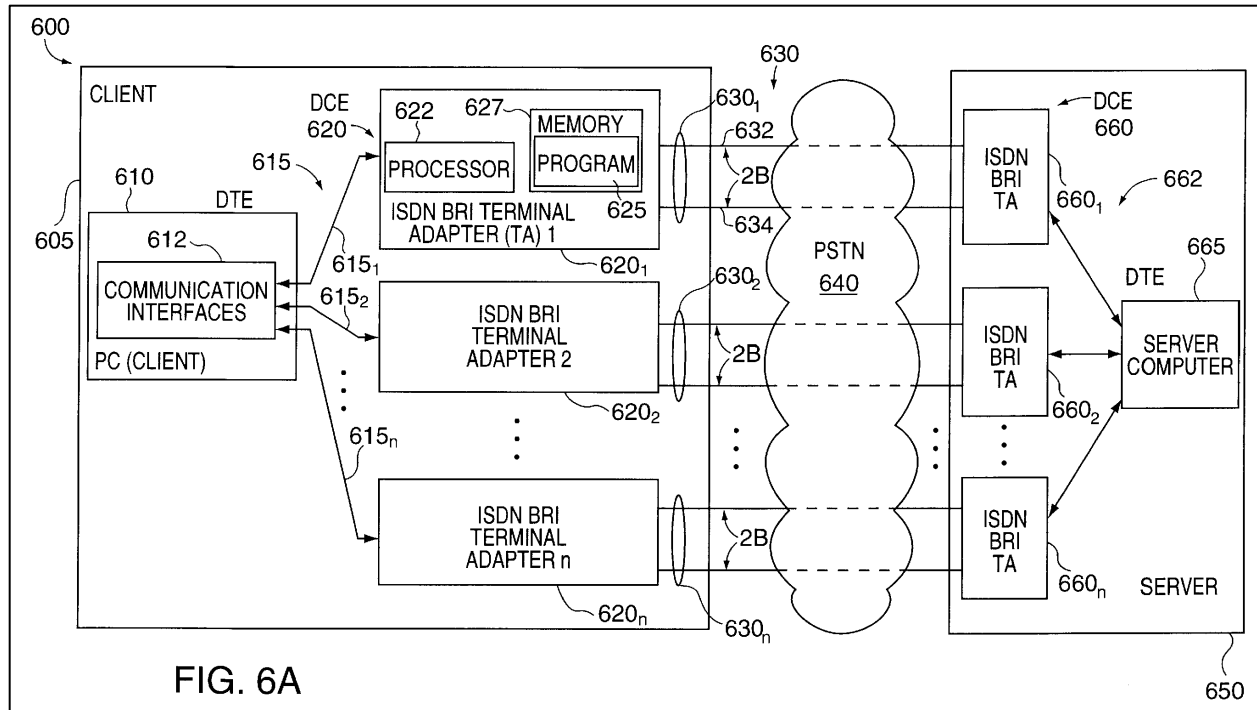


FIG. 6A

Maurya (EX1004), Fig. 6; *see also* Abstract (“A communications technique which permits incoming multi-link point-to-point (PPP) packets of a common PPP frame to be simultaneously transmitted across more than one outgoing link in a multi-link bundle.”); 1:10-17.

62. In *Maurya*’s system, a client is interconnected to the server through communication interfaces 612 connected via links 615₁ . . . 615_n to terminal adapters 620₁ . . . 620_n, each associated with corresponding links to a server 630₁ . . . 630_n, which has corresponding terminal adapters 660₁ . . . 660_n. *Id.*, 11:40-67. The communication interfaces 612, which are not specifically identified in the figure would typically be separate serial ports connected to the ISDN adapters through links 615. *Id.*, 11:40-49. Thus, like the ’908 Patent, *Maurya* discloses first and second

network interfaces (as in claim 1) each associated with a path to the server. '908 Patent (EX1001), Fig. 1 (using I/F to refer to the link between a main processor and drivers/modules); 2:61-65 (referring to ethernet, USB, or firewire ports as “interfaces for computer connectivity”); 3:65-3:10 (the CPU includes ports, modems/DAA for routing data and an 802.11b/g modules).

63. Maurya also provides a detailed background of the point-to-point protocol, including the multilink protocol (which Maurya accurately describes as a mechanism of the point-to-point protocol) through the use of link control protocol (“LCP”) packets. *Maurya* (EX1004), 3:1-8. To understand Maurya’s disclosure, it is helpful to understand the terms it uses to describe different systems and components; while Maurya’s use of these terms is consistent with how a POSA would have understood them, a layperson might be confused by some overlapping concepts. For example, in the above figure, “client” is used both to describe personal computer 610 and the overall client system 600 from which a request originates. *Id.*, Fig. 6. Therefore, I will discuss some of these terms.

64. First, in Maurya, a **peer** refers to a device that is (or seeks to be) part of the collection of devices exchanging data, including the client, server, and networking devices seeking to exchange data using the benefits of the multilink protocol. *Maurya* (EX1004), 5:29-37; *see also* 3:1-14. As examples, “peers” included terminal adapters, routers, or modems, that is, things that may be viewed

as data terminating equipment from the perspective of another endpoint. *Id.*, 7:6-13.

A **link** refers to a physical layer, such as a communications channel, over which data is carried from a device. *Id.*, 1:10-14. A **bundle** refers to a collection of links conveying the data-carrying packets for a given session; for example, a client computer and its terminal adapters, and it is helpful to think of a bundle as something that appears as a set of links that should be treated as one for the purposes of splitting and reordering packets. *Id.*, 3:1-9; *see also Ofelt* (EX1016), 5:20-29. By using the multilink protocol, the entire collection of links forms a single **pipe**, which logically behaves as one channel between the client and server. *Maurya* (EX1004), 3:6-14.

65. Maurya describes that the Maurya discloses that in the conventional PPP context, each peer, which includes a client, server, and each network device, would transmit an LCP “**Configure Request**” to configure a link to establish an initial connection add and remove connections, and test the link:

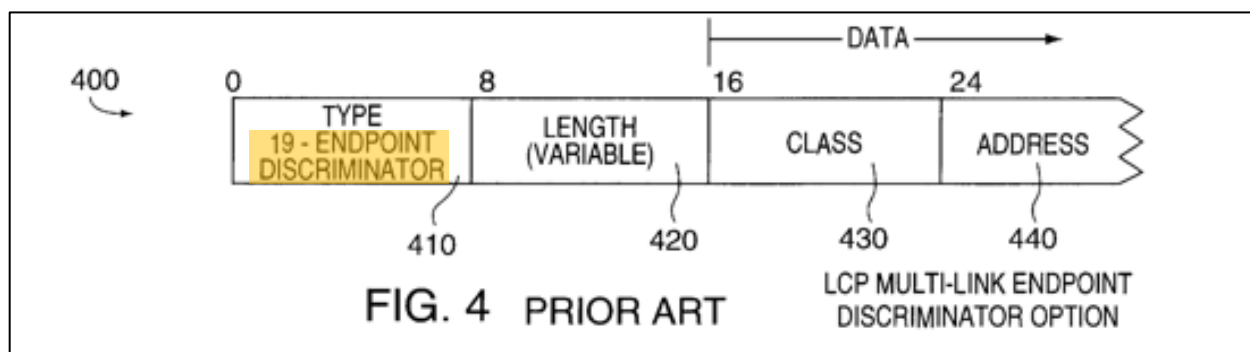
Initially, as shown, a link is in Dead state 110, during which the PPP protocol is inactive. . . . **[A] link control protocol (LCP), which as part of the PPP protocol, exercises responsibility for establishing and configuring the link**, remains in an initial or starting state. Once the physical layer has appropriately signaled that the link is ready, then the link transitions, as symbolized by UP line 115, to Establish state 120.

Id., 7:22-37; *see also* 1:52-55 (“Before any data is transmitted over a PPP link, each PPP peer connected to one end of the link will send LCP configuration packets to

the other end to establish and test the link; thus, ensuring the link is fully operational.”). As discussed above, LCP packets operated on the “data link layer” of communication systems, and they would be used to establish, test, and close a link, as well as set parameters for how data would be packaged and unpackaged. *See* ¶¶ 42, 49, *infra*; *see also Simpson* (EX1012), 1; 21–23 (describing different actions used to test the link).

66. Figure 2 of Maurya depicts a generalized LCP packet. *Maurya* (EX1004) Fig. 2; 6:23-25. Figure 3 shows one example of a type of configuration request, which is used to configure a link and negotiate parameters associated with a new or current link. *Id.*, Fig. 3; 6:26-28; 8:54-59. Included in this packet is an eight-bit type field that can be used to designate a multilink configuration using the values 17, 18, or 19. *Id.*, 8:60-65 (describing the type field); 9:1-9 (describing the three multilink type fields).

67. When the option 19 is used in the Type field, the basic LCP packet follows the format of Figure 4, which is the Multi-link Endpoint Discriminator Option packet:



Id., Fig. 4 (annotated); *see also* 9:14-18; 9:1-9. Thus, when a configuration request has “19” in the Type field, a message including this packet would be understood by the recipient as including *multilink request*, as recited in Claim 1.

68. As mentioned above, an endpoint discriminator, which was also known as an endpoint *identifier* (*Maurya*, 9:38-41, 10:22-26, 13:19-21) may be used to identify a link, but as *Maurya* teaches, it can be used for even more than that. *Maurya* discloses embodiments in which a unique endpoint discriminator may be assigned to all peers so that multiple outgoing links may be located at a given endpoint system, an idea that *Maurya* calls the “multi-multi” link protocol. *Id.*, 13:54-60.

69. This assignment of a unique endpoint discriminator to all peers is performed during LCP negotiations by having “a multilink PPP originator, such as . . . a client application executing at a PC, assign[] itself a unique endpoint discriminator value and inform[] all its immediate PPP peers” of this value using an LCP Endpoint Discriminator packet containing this value.” Each peer assumes this unique value as its own endpoint discriminator value and passes on LCP packets down the pipe, fanning out until “all the links in this pipe will be viewed, by the multi-link protocol, as part of a common bundle.” *Id.*, 14:5-21; *see also* 5:8-20, 5:29-55 (similar).

70. For example, if a client wishes to send a request to a server, it will assign itself an endpoint discriminator and, using the LCP endpoint discriminator

option packet, require each of the terminal adapters 620 to set this value as their own endpoint discriminator for communications to and from the server. *Id.*, 14:22-29; *see also* 14:35-37. When each of these terminal adapters of client 605 configure the link with each of the corresponding the adapters 660 at the server end of the pipe, they will provide this common endpoint discriminator via the LCP Configuration Request packet illustrated at Figure 4. *Id.*, 14:35-43; *see also* Fig. 6B. Then, “by virtue of the common endpoint discriminator associated [*sic*] the application executing at client PC 10,” the server will see all of the peers as part of a common bundle for packets generated by and destined to client 605. *Id.*, 14:50-60.

71. Upon setting up the link, the client may receive data from the server via the terminal adapters. *Id.*, 14:50-57; *see also* 8:56-10:5; 14:17-15:11 (describing the reception of packets at the client from the server), Fig. 8 (step 820). I discuss the segmenting/fragmenting of large data packets in more detail below. *See* ¶¶ 77–79, *infra*.

72. I note that the client comprises a client PC, i.e., a **personal computer**, 610, also referred to as “data terminating equipment (DTE)” for executing an application to configure a link. *Maurya* (EX1004), 7:6-13; *see also* 13:61-14:5; 5:29-37, 14:22-39; 14:50-52. The client PC executes application software to implement the multilink protocol techniques described by Maurya, such as “during the course of configuring links 615.” *Id.*, 14:22-29. Personal computers typically, if not

inherently, included processors, such as central processing units (CPUs), to execute application software; thus, a POSA would have recognized from Maurya's disclosure, Maurya's client PC would have included a processor to carry out the specialized multilink protocol implemented by client 605 to interface with server 650.

73. In my opinion, a POSA would have considered Maurya to be analogous art to the '908 Patent because it is both within the field of endeavor and reasonably pertinent to at least one problem concerning the named inventors of the '908 Patent. Maurya is within the field of endeavor of the '908 Patent, as it relates to techniques of communicating large amounts of between different devices, including in the context of the multi-link point-to-point protocol. *Id.*, 1:10-17. Additionally, it is reasonably pertinent to at least one problem concerning the inventors of the '908 Patent, namely, to provide higher level network services to more consumers, such as residential consumers, without severe infrastructure costs. '908 Patent (EX1001), 1:64-2:6; *see also Maurya* (EX1004), 4:52-55.

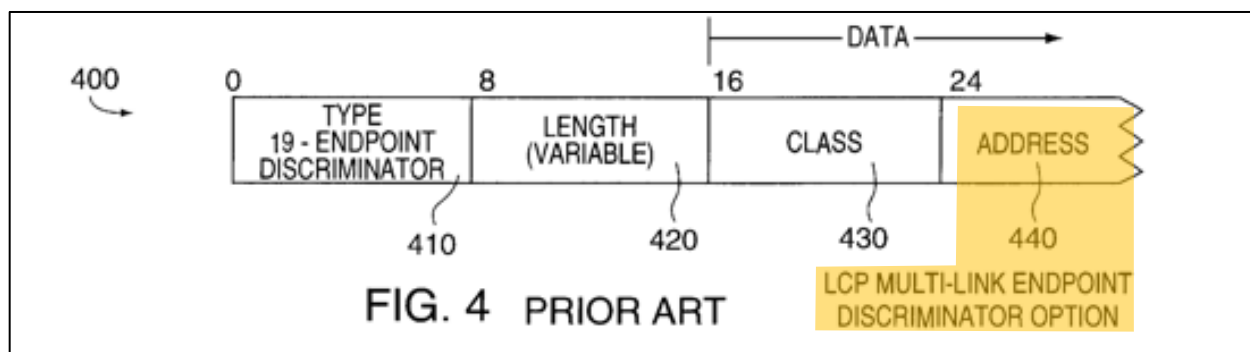
ii. Maurya's Endpoint Discriminator/Identifier as a Multilink Session Identification

74. In my opinion, a POSA would have appreciated that Maurya's endpoint discriminator is a *multilink session identification*, as in claims 1 and 13 of the '908 Patent, because it identifies the session using LCP configuration packets, which were used to configure and add and remove devices from a link. Indeed, one

example of multilink session identification described in the '908 Patent is the “magic number.” '908 Patent (EX1001), 12:9-14. As mentioned in Paragraphs 54 and 57–59 above, it was well known that “magic number” was class of endpoint discriminators, specifically Class 4. *Maurya* (EX1004) 9:42-44 (describing the role of a class field in an endpoint discriminator option packet).

75. *Maurya* discloses using the endpoint discriminator option to allow different peers, such as the client PC and, through it, the terminal adapters 620, to join a link:

[A]n LCP Configure Request packet 35 specifies a multi-link endpoint discriminator option whenever the type field of the LCP Configure Request packet is set to value nineteen, as is field 410. Identification of the endpoint system (commonly referred to as either an “endpoint discriminator” or “endpoint identifier”) is accomplished through class field 430 and address field 440, which collectively contain data carried by this packet.



Id., 9:35-42, Fig. 4 (annotated); 1:52-55 (“Before any data is transmitted over a PPP link, each PPP peer connected to one end of the link will send LCP configuration

packets to the other end to establish and test the link.”). Endpoint discriminators were used to determine if a link is part of an existing bundle of links connecting these peers or if a new bundle should be established. *Id.*, 9:25-31; *see also* 10:22-29.

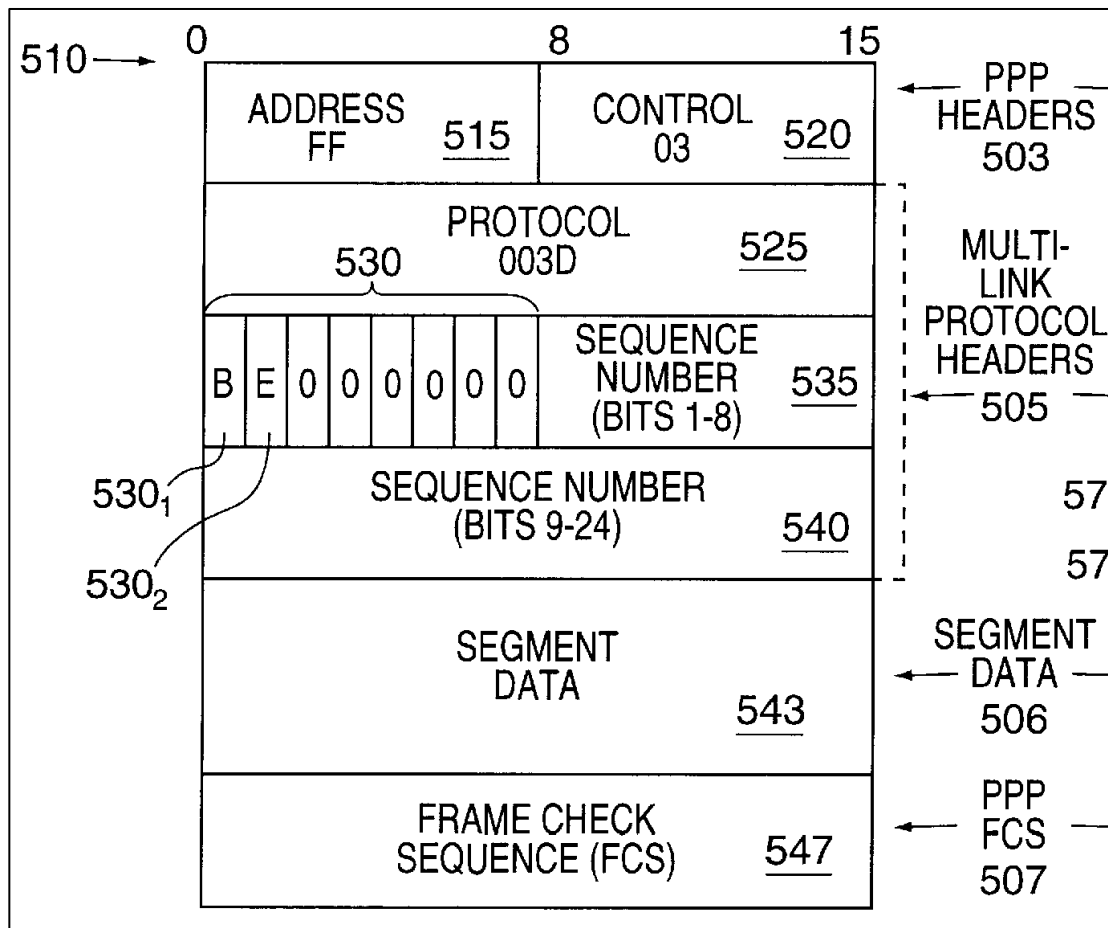
76. As Maurya explains, its system would function “equally well” with any endpoint discriminator address class. *Id.*, 9:49-55. Thus, in my opinion, and to the extent Patent Owner argues that a multilink session identification is limited to magic numbers, such would have at most been an obvious variation of Maurya’s teachings in view of the knowledge and ordinary skill of a POSA, as there were only a finite number of class options for the endpoint discriminator packet, and a POSA would have recognized predictable advantages and disadvantages with each type of class.

iii. Providing an Increased Data Rate through Multilink Communications

77. Multilink communications provide “enhanced channel bandwidth” bandwidth by splitting large data packets into smaller packets called segments or fragments. *Maurya* (EX1004), 6:66-7:6; *see also* 12:16-21, 12:32-42 (explaining that a client may segment packets to send across a link to a server). *Maurya* also explains that the “multi-link protocol . . . can assign additional bandwidth, on demand, (so-called “BonDing”) in those situations where two PPP peers can be connected through multiple physical links in a common bundle.” *Maurya* (EX1004), 3:1-9. By treating multiple physical links as one logical channel, called a pipe, the multilink operation “dynamically provide[s] sufficient transmission bandwidth for

the underlying communication that is then to be carried by the channel.” *Id.* 3:6-14; *see also* 2:66-3:1 (explaining that Maurya’s system provides “increases in transmission bandwidth to a network user.”).

78. Payload data is encapsulated as segments in a given PPP packet, illustrated by Maurya’s Figure 5:



Id., 9:56-10:5; Fig. 5. The PPP headers 503 include a set address field, “FF,” and control field having a set value of “03(hex).” *Id.*, 10:34-37. multilink header includes protocol field 525, where the value 003D “identifies the multilink protocol” to indicate how the packet is to be processed. *Id.*, 10:39-42. The sequence number fields

include a sequence number that is used to properly reorder packets as flag fields that indicate whether the packet is a beginning segment, ending segment, or neither/a middle segment. *Id.*, 10:42-58.

79. Segment data is included in every PPP packet as **field 543** for long-sequence format packets, and it includes the “actual segment data . . . carried by this multi-link PPP packet.” *Id.*, 10:58-59; *see also* 11:13-18 (segment data field is identical for short-sequence format). In Maurya’s inventive embodiments, the packet “has the general format” of Figure 5, but if packets are to be further split at a receiving side, then each multi-link PPP device situated at the level of the split further encapsulates the incoming packets as segment data and adds a sequence number representative of the particular “frame segment” that was split. *Id.* 15:11-25; *see also* Fig. 6C.

80. As a POSA would have recognized, by virtue of providing increased bandwidths, Maurya’s ML-PPP system using multiple outgoing links at a client device provides increased transfer rates between two communicating devices. Indeed, as I mentioned in Paragraph 53 above, this benefit was a known feature of using the multilink protocol, as the ’908 Patent itself acknowledges.

iv. Claim 5 of the ’908 Patent

81. Claim 5 of the ’908 Patent depends from claim 1 (which I understand to mean that it incorporates all of the limitations of claim 1) and adds that “*each of*

the first network interface and the second network interface is one or more of cellular interface, Wi-Fi interface, a wireless interface, a cable interface, a wired interface, an Ethernet interface, a Bluetooth interface, a near-field communication interface, and an optical interface.” As an initial matter, by including both *wireless* and *wired* interfaces, claim 5 encompasses the entire universe configuring a network interface to communicate.

82. Maurya’s system uses ISDN terminal adapters connected to the client PC’s communication interfaces 612 via links 615, which Maurya also refers to as “leads.” This would indicate a wired connection to a POSA. Additionally, the ISDN was a wired network system that allowed digital communications over the existing telephone network. *See, e.g., Beckman* (EX1017), 11.

v. **Overview of Low**

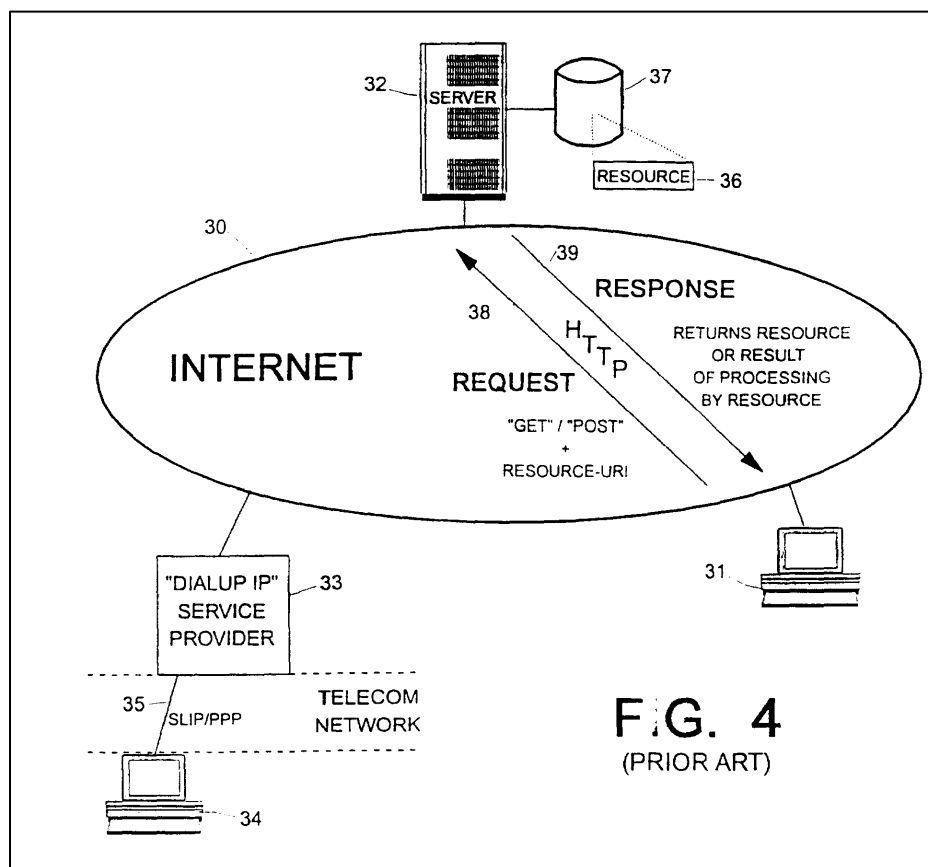
83. Low relates to providing resources supporting call-setup in a telephone system using servers connected to a computer network logically distinct from the telephone system infrastructure. *Low* (EX1005), Abstract. A resource is locatable using a uniform resource identifier (URI) associated with a particular telephone number. *Id.* Examples of service resource items include telephone numbers, service logic, downloadable service data, or downloadable service logic. *Id.*, 17:28-18:4. A server holding a service resource item may be a typical HTTP server. *Id.*, 18:6-7.

84. Low explains that it is a cornerstone of the World Wide Web to address

information using a URI, generally either by a uniform resource locator (URL) or a uniform resource name (URN) that can be resolved into a URL:

A cornerstone of the WWW is its ability to address particular information resources by means of an [sic] Uniform Resource Identifier (URI) that will generally be either a Uniform Resource Locator (URL) that identifies a resource by location, or a Uniform Resource Name (URN) that can be resolved into a URL.

Id., 12:1-4; *see also* 18:6-7 (as used in Low's disclosure, URIs are URLs and/or URNs). A request for something at a server would typically include a resource URL, such as a URL:



Id., Fig. 4; *see also* Fig. 8.

85. As Low indicates, and as was known, the use of URLs was known for user terminals and internet service providers employing the point-to-point protocol (PPP) to communicate packets. *Id.*, 11:21-30; *see also* 46:23-27.

86. In my opinion, a POSA would have considered Low to be analogous art to the '908 Patent because it is both within the field of endeavor of the '908 Patent and reasonably pertinent to at least one problem concerning the inventors of the '908 Patent. Low is within the field of endeavor of the '908 Patent because it relates to methods of accessing resources through a switched telecommunications system, including using the point-to-point protocol to allow users to communicate with an internet service provider (ISP) via a public telephone system. *Id.*, 1:7-9; *see also* 11:21-26, 46:23-27. Low is also reasonably pertinent to one problem concerning the inventors of the '908 Patent, such as the ability to provide users with communication and data services not provided by local exchange companies. '908 Patent (EX1001), 1:67-2:6. For example, Low discloses that its invention provides enhanced services to a user through different types of communications systems to provide a more “synergistic relationship” between the world of telephone networks and internet-based information services. *Low* (EX1005), 2:1-16.

vi. Motivations to Combine Maurya and Low

87. Combined with Low, Maurya's client 605 would direct communications to a server 650 using uniform resource locators, *destination URLs*,

as recited in the first- and second- message limitations of each of claims 1 and 13. A POSA would have been motivated to incorporate the more specific teachings of Low regarding communications between a client and a server because such would have been a matter of combining prior art elements (e.g., the contents of packets, as disclosed by Maurya and Low) according to known methods (e.g., using the known ML-PPP) to yield predictable results. Maurya itself describes its disclosure in the context of accessing HTML links via a web browser to visit websites over the “world wide web.” *Maurya* (EX1004), 1:65-2:25. For example, Maurya describes in its background how users click “on a hypertext link or otherwise selects a web page” to access HTML resources at “a remote web server “through an Internet connection.” *Id.*, 2:9-15.

88. However, because Maurya’s invention is specific to operations of the *data link layer* (i.e., specific fields of a particular kind of LCP packet) it does not go into detail regarding other information that may be included in the message, such as information for identifying the server resource. Low simply provides additional context that Maurya lacks regarding what happens when a user clicks on a link on a web browser, providing implementation details regarding accessing a resource via a web browser. *Low* (EX1004), 13:24-14:5. Namely, Low describes two ways to identify a unique resource: by a URL or by a uniform resource name (URN) that can be resolved into a URL. *Id.*, 12:1-4; *see also* 18:6-7 (“Preferably, where URIs are

referred to in the foregoing, these URIs are URLs and/or URNs. Furthermore, the servers referred to are preferably HTTP servers.”). Thus, a POSA would have been motivated to incorporate Low’s teachings to include a destination URL in messages sent from the client 605 to the server 650 when configuring a link, such as in a field identifying a desired resource or an address field generated by the appropriate network communications layer, which comes “before” the data link layer from the perspective of a sender, as I discussed above in Paragraphs 40-48.

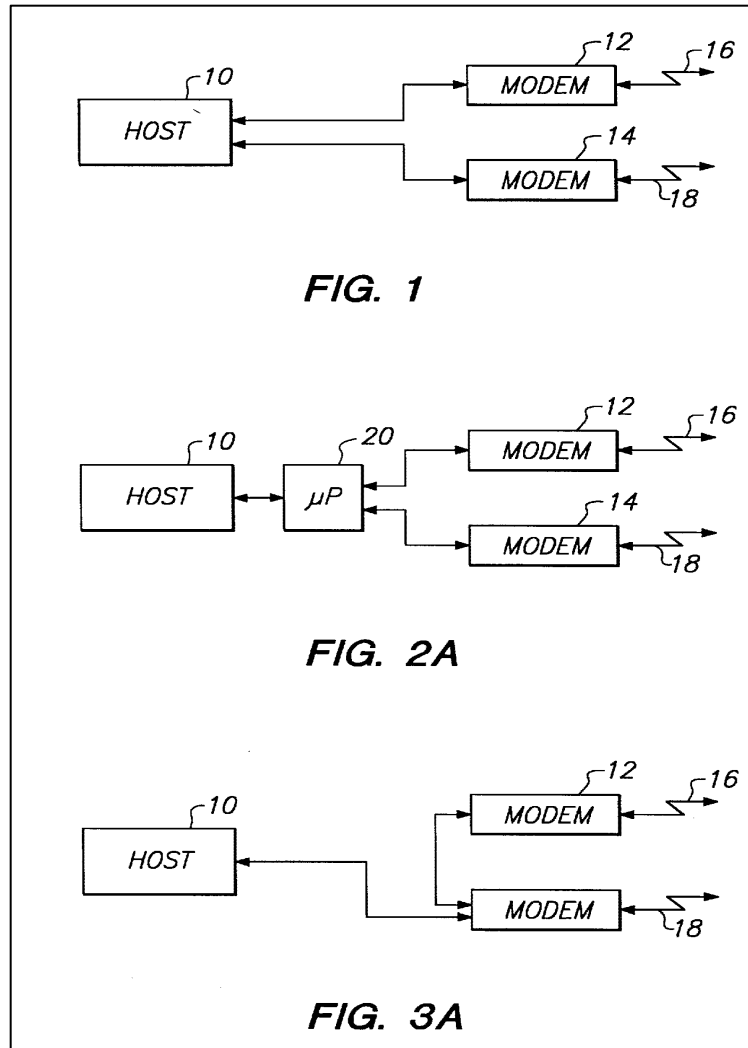
89. In my opinion, POSA would have had a reasonable expectation of success in making the combination because the prior art describes similar data-link protocols for accessing resources on the web, and the combination therefore merely involves at most minor modifications in software using known communication techniques. Low confirms that the use of URLs was known for user terminals and internet service providers employing the point-to-point protocol (PPP) to communicate packets. *Low* (EX1004), 11:21-30 (serial line interface protocol and point-to-point protocol “allow Internet packets to traverse ordinary telephone lines”); *see also* 46:23-27; 18:6-7, Fig. 6. Low also contemplates its own system using the PPP over multiple channels, such as through the use of ISDN lines. *Id.* 42:7-12 (noting that the use of ISDN lines, used in the preferred embodiments of Maurya, would allow use of PPP over multiple channels, thus not tying up an ordinary telephone line). A POSA would have known (and Maurya confirms) that

the multi-link protocol was simply a particular mechanism, or application, of the point-to-point protocol. *Maurya* (EX1005), 3:1-8.

E. The Combination of Maurya, Krishnan, and Low

i. Overview of Krishnan

90. Krishnan relates to methods for providing high-speed inter-computer data transmissions using multiple low-speed links. *Krishnan* (EX1006), Abstract. Krishnan accomplishes this using link control software to send data over multiple modems, 12 and 14, with various possible arrangements, such as by using separate data ports to connect modems 12 and 14 directly to the host (Figure 1), using an additional controller 20, which can be a stand-alone unit or add-in card within the host (Figures 2A–2B) or a specially programmed multi-linked modem 34 that can daisy-chained with other modems (Figures 3A–3B):



Id., Figs. 1, 2A, and 3A;⁴ *see also*; 1:25-32; 1:42-47 (modems are combined or bonded to create a high-speed data link using two low-speed links).

91. Krishnan discloses communication systems and methods between a two

⁴ It appears that Figure 3A is missing a reference number for the first modem, multilink modem 34, which is shown on Figure 3B and described in the specification. *Krishnan* (EX1006), 3:66-4:6

computers using the multilink protocol. *Id.*, Abstract; *see also* 2:31-36 (“Host computer 10 is also programmed with link control software implementing a multi-link data communication protocol such as the Multi Link Point-to-Point Protocol”); *see also* 4:505:6 (claim 1, reciting communications between host and a remote computer), *see also* claims 3, 10, 16. The modems may communicate using different transfer rates (*id.*, 3:2-5) or equal transfer rates (*id.*, claim 9).

92. Computer 10 includes software, or is connected to a controller that executes software, that uses the modems to carry out multilink point-to-point protocol software, which provides the transmitting and receiving sites to achieve higher bandwidth by “split[ting] a single high speed data stream into multiple parallel data streams” that can be recovered at the receiving site as a high-speed data stream. *Id.*, 2:33-41; *see also*, 3:53-65 (in certain embodiments, host may or may not “see” modems as multiple logical connections); claims 1, 10. Computer 10 may be “an IBM compatible PC or other personal computer.” *Id.*, 1:36–42.

93. In my opinion, a POSA would have considered Krishnan to be analogous art to the '908 Patent because it is both within the field of endeavor of the '908 Patent and reasonably pertinent to problems concerning the inventors of the '908 Patent. Krishnan is within the field of endeavor of the '908 Patent, as it relates to techniques of communicating large amounts of data between different devices, including in the context of the ML-PPP. *Id.*, 2:22-41. Additionally, Krishnan is

reasonably pertinent to at least one problem concerning the inventors of the '908 Patent, such as providing enhanced services using existing public-telephone network connections. *Id.*, 1:36-50; *see also* '908 Patent (EX1001), 2:45-60 (device connected to primary plain-old-telephone-service line).

ii. Krishnan's Architecture Applies to Client Devices

94. While Krishnan does not illustrate the setup of the remote computer, a POSA would have recognized, or at least found obvious, that Krishnan's disclosure also applies to a receiving site, such as a Maurya's client 605, so that both communicating devices may take advantage of the multilink protocol. Krishnan confirms that the arrangements described were applicable to commercially available client personal computers, such as "an IBM compatible PC or other personal computer." *Id.*, 1:36-42; *see also* 2:24-26. And although Krishnan describes the host as a server in one embodiment (EX1006, 3:8-14), the configuration applies to a client, as computers typically would be able to both send and receive data.

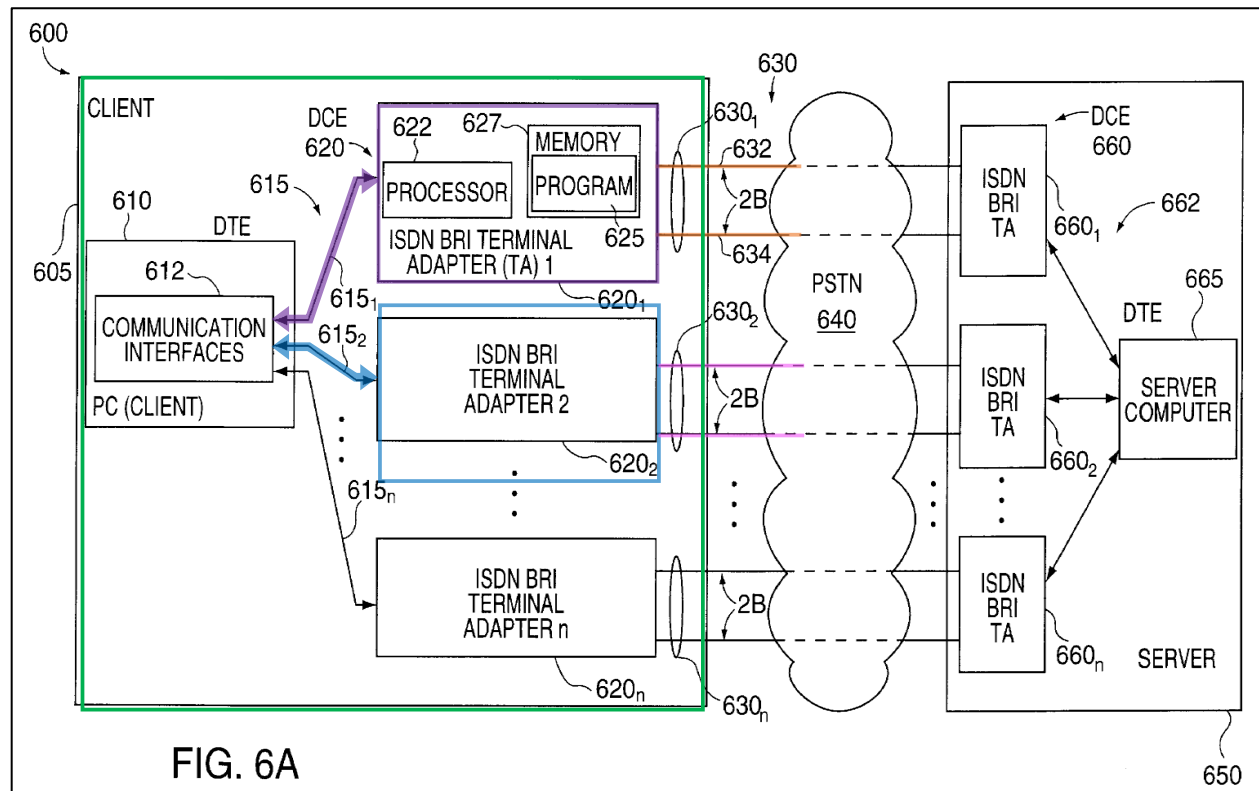
95. Further, based on Krishnan's disclosure that the "receiving site receives and demultiplexes the multiple low speed data stream to recover the original high speed data stream" a POSA would have recognized that the receiving site requires separate interfaces to receive data over multiple links (as indicated by the bidirectional paths illustrated in the figures). *Id.*, 2:39-41; *see also* claims 3, 10, 16 (remote computer receives data over multiple links).

96. To use the multilink protocol, both ends of a pipe must be able to and agree to employ it; otherwise, the requisite acknowledgments would never be received for configuration requests establishing the link. Further, as Maurya confirms, ML-PPP clients and servers were capable of employing multiple links. *See, e.g., Maurya* (EX1004), Fig. 6A (client includes multiple communication interfaces and links); *see also* Abstract, 6:66-7:6. Thus, in my opinion, a POSA would have appreciated from Krishnan's disclosure that the arrangement for computer 10 illustrated in Figures 1–3 was applicable to a receiving client or a transmitting server. For the purposes of understanding the combination of Maurya with Krishnan, discussed in Section E.iii below, I refer to the architecture of Krishnan's computer 10 with the understanding that, in the combination with Maurya's teachings regarding the multilink protocol using multiple links at one client, the modems are client-side network devices.

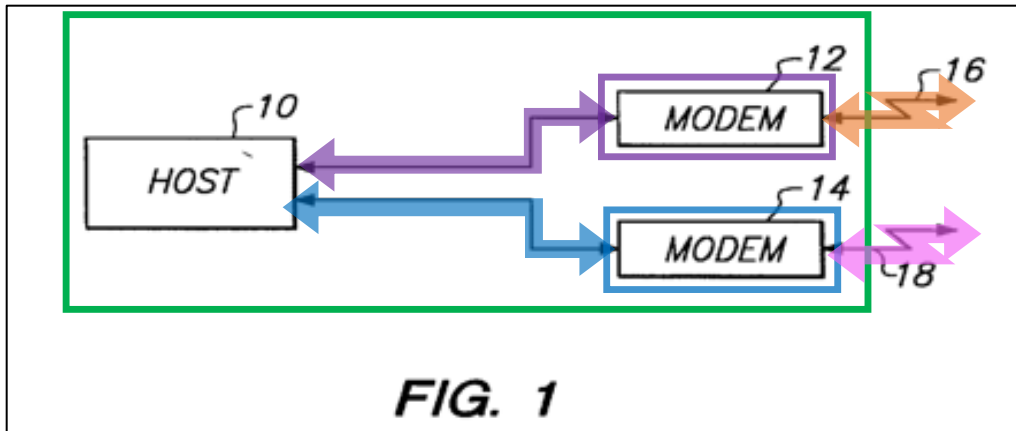
iii. Motivations to Combine Maurya, Low, and Krishnan – Use of Modems as Multiple Outgoing Links

97. Combined with Krishnan, Maurya's client 605 would communicate with a server using multiple modems. Indeed, Krishnan's system is similar to Maurya's in that a personal computer is associated with multiple links for handling multilink communications. For example, as relevant to claim 1, *Maurya* discloses *a first network interface* (the interface to ISDN adapter 620₁, purple) *having a first data transfer rate associated with a first path* (630₁, orange) *from the server to . . .*

the client device (green) and a second network interface (the interface to ISDN adapter 620₂, blue) having a second data transfer rate associated with a second path (630₂, pink):



Similarly, Krishnan discloses a computer 10 that includes a first *network interface* (the interface with modem 12, purple) having a first data transfer rate associated with a first path (path 16, orange) from the server to the client (green) and a second *network interface* (the interface with modem 14, blue) having a second data transfer rate associated with a second path (path 18, pink):



98. In my opinion, a POSA would have been motivated to combine Maurya's ML-PPP systems with Krishnan's regarding the use of modems to achieve multilink communications for three reasons. First, Krishnan provides express motivation to combine, explaining that modems were cheaper and more widely available than ISDN connections. *Krishnan* (EX1006), 1:25-33. The cost-effectiveness of a network system is always one consideration of implementors.

99. Second, a POSA would have recognized that using Krishnan's modems would have been a simple matter of applying a known technique (the use of multiple network devices, such as modems) to a known device (an ML-PPP client device) ready for improvement to yield predictable results. Although Maurya suggests that conventional modems did not themselves possess multiple incoming and outgoing links (*Maurya* (EX1004), 4:33-41), Krishnan, which was published after Maurya was filed, addressed this by arranging the modems in a setup similar to Maurya's ISDN adapters—by linking multiple modems to a computer programmed with link control software to manage the modems as different links. *Krishnan* (EX1006), 2:31-

41; 3:59-65. Additionally, the concept of configuring a central client based processor to perform functions like managing the modems and controlling the ML-PPP communication links, such as at personal computer 605, would have been a simple matter combining prior art elements (Krishnan's modem-based architecture and Maurya's teachings related to PPP communications) according to known methods (ML-PPP communications) to yield predictable results (the communication of data using the multilink protocol).

100. Finally, the proposed combination would have at most amounted to a simple substitution of one known element (Krishnan's modems) for another (Maurya's ISDN adapters) to obtain predictable results, namely, the communication of multilink packets to and from a server over the PTSN using alternative networking devices.

101. Further, in my opinion, a POSA would have had a reasonable expectation of success in making the modification because both Krishnan and Maurya are similar systems that use the multilink protocol and have similar goals (transmitting and receiving large amounts of data), and Maurya confirms that it was possible for clients to communicate using multiple devices via the ML-PPP. For example, both Maurya and Krishnan show these multiple network devices at a single system including a personal computer that is programmed with software to execute the multilink protocol. *Maurya* (EX1004), 3:46-53, 7:6-13, 13:61-14:5; *see also*

Krishnan (EX1006), 1:40-42, 2:24-26, 2:33-36. Maurya discloses techniques for clients to communicate using multiple ISDN adapters via the ML-PPP; *Krishnan* teaches using multiple modems. And, like Maurya, *Krishnan* discloses that its application of the multilink protocol using multiple modems provided for higher transfer rates. *Krishnan* (EX1006), 1:36-50; *see also* Abstract, 2:36-41 (similar); claim 11 (a processor transmits data at a data rate of $N+M$ by transmitting data over multiple modems).

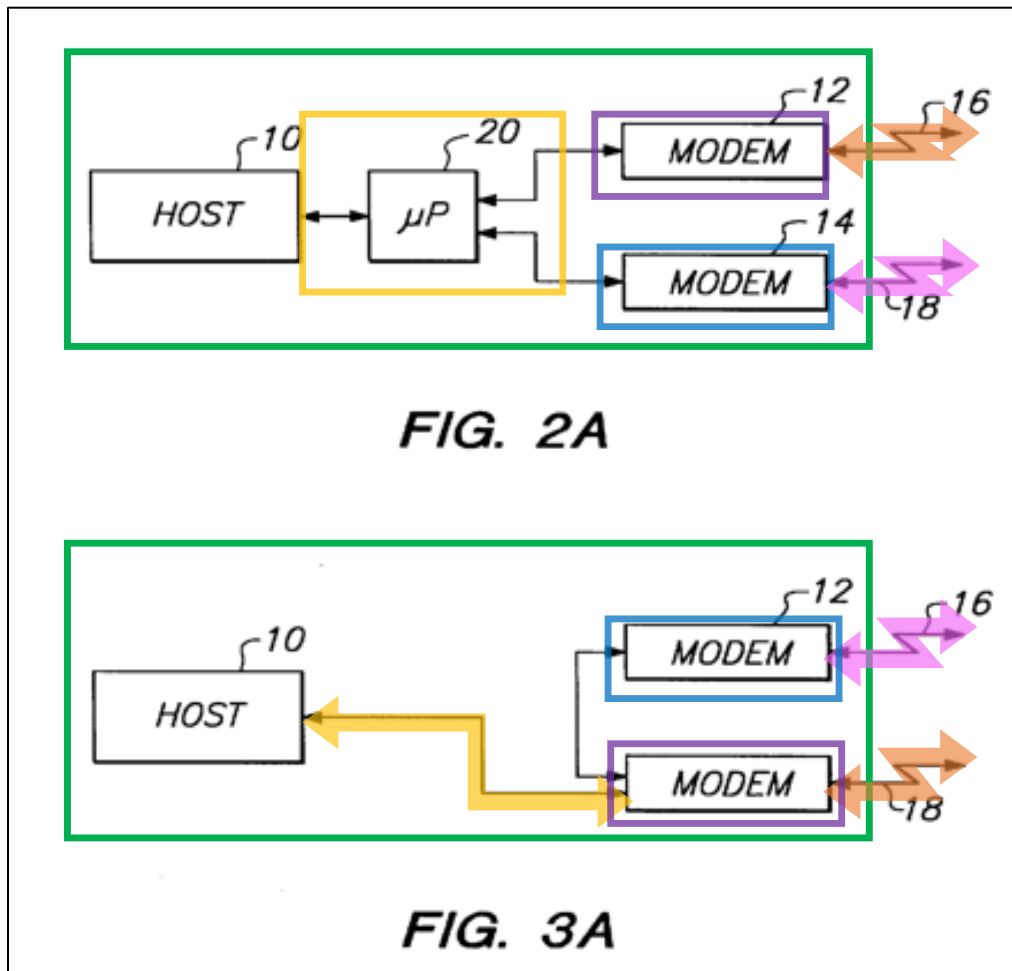
102. Regarding claim 5 of the '908 Patent, I note that this arrangement would still provide a *wired* interface based on *Krishnan*'s disclosure. For example, an RS-232 interface may couple the modems to ports of the host computer (EX1006, 1:39-42), and paths 16 and 18 go to PTSN telephone lines (EX1006, 2:25-27).

iv. Motivations to Combine – Krishnan's Alternative Embodiments

103. In my opinion, the above motivations to combine would apply to all three of the alternative arrangements described by *Krishnan*, as Maurya's client PC 610 would send the relevant first and second LCP messages to each of the modems, either directly or indirectly, so that they would assume the same unique endpoint discriminator value of the PC client 610 before configuring the link with the server. For example, *Krishnan* mentions that the host computer may have device driver software to "see" each modem and manage them through multiple logical connections, despite only one physical connection to the controller/multilink

modem. *Krishnan* (EX1006), 3:56-65.

104. In these embodiments, there may therefore be one physical network interface (yellow) at the client device (computer 10 in *Krishnan*, personal computer 610 in *Maurya*), but the computer would still send LCP configuration packets to first (purple) and second (blue) modems, where each modem would be associated with its own transfer rate (e.g., represented by paths 16 and 18) to another device, such as a server or peer.



Id., Figs. 2A, 3A (annotated); *see also* 3:20-23 (describing communication controller

20); 3:66-4:3 (describing multilink modem 34).

105. Thus, A POSA would have recognized the same motivations and expectations of success in combining Maurya's teachings regarding a client device using the ML-PPP with multiple outgoing links with Krishnan's alternative arrangements as with the Figure 1 embodiment, as Maurya's teachings relate to managing an endpoint with multiple outgoing links, and Krishnan simply discloses alternative ways of arranging those links.

F. The Combination of Maurya, Low, and DeLangis-156 and Maurya, Krishnan, Low, and DeLangis-156

i. Overview of DeLangis-156

106. I understand that DeLangis-156 is in the same family as, and precedes, the '908 Patent. There specifications of the patents are similar, although there appear to be some differences, such as in the title, abstract, and minor changes to the figures, such as the exclusion of a description under the figures of the '908 Patent. I understand DeLangis-156 is available as prior art to the '908 Patent if the chain of the '908 Patent failed to properly claim priority to DeLangis-156, such as by claiming concepts unsupported by the written description of DeLangis-156 or an intervening patent application. While I have offered testimony that may be relevant to this inquiry, I am informed that the proponent of a priority claim bears the burden of showing that certain statutory requirements have been met, and I reserve the right to review and respond to technical assertions made by Patent Owner relevant to its

priority claim.

107. Regarding Figure 7, which discusses the use of the multilink protocol, DeLangis-156 describes the use of a “magic number” as a multilink session identification, recited in the second-message limitations of claims 1 and 13 of the ’908 Patent. *DeLangis-156* (EX1007), 12:52-58.

ii. Motivations to Combine Maurya, Krishnan, Low, and DeLangis-156

108. In my opinion, a POSA would have been motivated to implement Maurya’s teachings regarding an endpoint discriminator option packet using a magic number (i.e., a multilink session identification), as taught by DeLangis-156. For example, such a combination would have amounted to at most a simple substitution of one known element (an endpoint discriminator for a client device) for another (a magic number unique to a multilink session) to obtain predictable results, namely, the same result accomplished by Maurya in unifying a set of fragments coming from different outgoing links.

109. Further, while Maurya suggests that a server may provide its endpoint discriminator to be used (*see, e.g.*, EX1004, 13:61-65), it does not disclose that this identifier is assigned by the server in a session set up by a client device for receiving packets from the server, as recited in Claim 3 of the ’908 Patent. However, a POSA would have been motivated to employ the server’s endpoint discriminator as part of the LCP negotiation process in light of the teachings of DeLangis-156, which

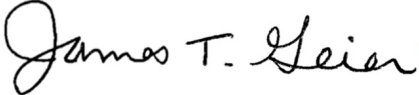
describes that the “magic number” is assigned by the server. *DeLangis-156* (EX1007), 12:11-16. A POSA would also have been motivated to employ a magic number assigned by the server, as recited in claim 3 of the ’908 Patent and taught by *DeLangis-156*, as such would have been the combination of prior art elements (the different types of identifying information) according to known methods (known LCP configuration techniques) to yield predictable results. Further, using the server to assign a magic number would have at least been obvious to try, as only a finite number of devices along a given pipe would supply the identification information for a given session, and one of the ends of the link, which would have been involved in negotiating the configuration options for the link, would be a common-sense choice of these finite options.

110. Further, and consistent with my opinion in Paragraph 76 above, a POSA would have had a reasonable expectation of success in making the combination, as magic numbers were already a known class of endpoint discriminator options, and Maurya states that its system would function “equally well” with any class of endpoint discriminator address. *Maurya* (EX1004), 9:50-55. Thus, the combinations proposed above would have involved at most minor modifications in software and yielded predictable results.

IV. CONCLUSION

111. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were 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.

Date: March 1, 2023

By: 
James Geier

APPENDIX A

James T. Geier

CONTACT INFORMATION

Name: James T. Geier

Title: Principal Consultant

Company: Wireless-Nets, Ltd.

Address: 2468 Locust Hill Blvd., Beavercreek, Ohio 45431 U.S.A.

Email: jimgeier@wireless-nets.com

Cell Phone: +1 937-829-0008

Website: www.wireless-nets.com

PROFILE

James Geier has 40 years of experience in the communications industry designing, analyzing, and implementing communications systems, wireless networks, and mobile wireless devices. He has authored over a dozen books on mobile and wireless topics, including Designing and Deploying 802.11 Wireless Networks (Cisco Press), Implementing 802.1X Security Solutions (Wiley), Wireless Networking Handbook (New Riders) and Network Re-engineering (McGraw-Hill). He had been an active participant within standards organizations, such as the IEEE 802.11 Working Group and the Wi-Fi Alliance. He has served as Chairman of the IEEE Computer Society, Dayton Section, and various conferences dealing with wireless networking.

PROFESSIONAL EXPERIENCE

Principal Consultant and Founder – *Wireless-Nets, Ltd. (Apr 2000 - present)*

- Designs mobile devices and implements corresponding software / firmware.
- Designs and integrates Wi-Fi, Bluetooth, cellular, Ethernet and USB transceivers into mobile devices, such as smart phones, hospital patient monitors, cable T.V. boxes, and bar code scanners.
- Designs large-scale wireless networks for municipalities, hospitals, airports, and manufacturing facilities for supporting voice, video and data applications.

President, CEO, and Cofounder – *Health Grade Networks LLC. (Aug 2014 – Dec 2015)*

- Provided strategic direction and management of the company for implementing wireless network solutions.

Product Engineer / Manager - *Monarch Marking Systems (Aug 1996 – Mar 2000)*

- Designed and implemented RF radios for Monarch's bar code scanners and printers.
- Integrated Ethernet and USB transceivers into tabletop printers.
- Designed and implemented wireless middleware software for improving performance between mobile wireless devices and application servers.
- Designed and implemented wireless network infrastructures for wireless bar code scanners and portable printers used in retail and manufacturing applications.

Senior Systems Engineer - *TASC, Inc. (Mar 1994 to Jul 1996)*

- Designed and implemented an enterprise-wide Ethernet / IEEE 802.3 and wireless network for Dayton Power and Light to support the migration from mainframe to client/server systems.
- Designed an information system architecture that supports internal and external communications for the U.S. Navy's NSSN attack submarine.
- Analyzed requirements for hardware, software, and support of the Joint Logistics Systems Center (JLSC) Materiel Management Standard System (MMSS) for the combined U.S. militaries.

Senior Systems Engineer - Adroit Systems, Inc. (Aug 1992 to Feb 1994)

- Researched and analyzed emerging wireless network technologies as part of the Department of Defense Airborne Reconnaissance Data Link Architecture (ARDA) study, supporting communications for airborne systems.
- Designed a software tool that aids network engineers in planning, upgrading and maintaining shipboard computer networks - based on a Small Business Innovative Research (SBIR) government grant obtained from the U.S. Navy.

Systems Design Engineer - Information Systems Center, Captain U.S. Air Force (Sep 1990 – Jun 1992)

- Evaluated the effectiveness of wireless LAN technology for use in mobile and portable military environments.
- Represented the Air Force as part of the IEEE 802.11 Wireless LAN standards development.
- Designed and implemented large-scale Ethernet / IEEE 802.3 LANs and WANs for various government organizations.

Communications Test Engineer - AFCC Operational Test and Evaluation Center, Lieutenant U.S. Air Force (Sep 1986 - May 1989)

- Performed analog, digital, and protocol tests on various government wireless computer networks and long-haul communications systems.
- Developed approaches and methods for testing computer networks.

Radar Technician - 75th TCF, U.S. Air Force (Dec 1977 - Jun 1983)

- Performed acceptance testing of newly designed radar systems.
- Maintained automatic tracking radar systems in support of tactical Air Force operations worldwide.

EDUCATION

M.S., Electrical Engineering, *Air Force Institute of Technology (1990)* – thesis involved designing and implementing a wireless mesh network for the U.S. Department of Defense.

B.S., Electrical Engineering, *California State University (1985)*.

MILITARY EXPERIENCE

U.S. Air Force, Dec 1977 – Jun 1992 (Commissioned Officer Mar 1986 – Jun 1992).

BOOK PUBLICATIONS

- *Designing and Deploying 802.11 Wireless LANs (2nd Edition)*, Cisco Press, 2015.
- *Designing and Deploying 802.11n Wireless LANs*, Cisco Press, 2010.
- *Implementing 802.1x Security Solutions*, Wiley, 2008.
- *Deploying Voice over Wireless LANs*, Cisco Press, 2007.
- *Computer Security*, Wiley, 2007.
- *Computer Transfer and Backup*, Wiley, 2007.
- *CCIE Routing and Switching – Official Exam Certification Guide, 2nd Edition*, Cisco Press, 2006.
- *Wireless Networks – 5-minute Fixes*, Wiley, 2006.
- *PCs – 5-minute Fixes*, Wiley, 2006.
- *Wireless Networks – First Step*, Cisco Press, 2005 (translated to Chinese, French, Hungarian, Italian, Korean, Polish, Portuguese, and Romanian).
- *Certified Wireless Analysis Professional - Official Study Guide*, McGraw-Hill, 2004.

- *Wireless LANs, 2nd Edition*, SAMs, 2001.
- *Wireless LANs*, Macmillan Technical Publishing, 1999.
- *Wireless Networking Handbook*, Macmillan (New Riders) Publishing, 1996.
- *Network Re-Engineering*, McGraw-Hill, 1996.

INDUSTRY AFFILIATIONS

Chairman, IEEE Computer Society - Dayton Section:

- Managed the 900-member organization and established a continuing education program.

Chairman, IEEE International Conference on Wireless LAN Implementation:

- Managed all aspects of the conference from 5/91 to 12/92.

Member, Wi-Fi Alliance

- Voting member of the Wireless ISP for Roaming (WISPr) committee.

IEEE 802.11 Wireless LAN Working Group

- Represented interests of the Department of Defense for dealing with applications and frequency allocations.

TEACHING EXPERIENCE

U.S. Naval Post Graduate School

- Developed and regularly instructed a course on wireless network design and security to students and faculty.

Wright State University

- Periodically instructed graduate courses on computer communications.

USAF Test and Evaluation School

- Developed and instructed a 240 hour training course on wireless system test and evaluation.

Conferences

- Regularly gives presentations at international conferences, including Supercomm (Asia), Scantech (Germany), and IBC (England).

Infocomm Solutions

- Developed and instructed workshops in India, Singapore and Malaysia on wireless network implementation.

Technology Training Corporation (TTC)

- Developed and instructed international training courses in Mexico and South America on wireless networking and network re-engineering.

Educational Services Institute

- Developed and instructed courses on software project management, software testing, system integration and network re-engineering as part of the Project Management Institute (PMI) Project Management Professional (PMP) certification program.

Onsite Training

- Regularly instructs workshops on wireless network design and deployment for product developers, system integrators, hospitals, and enterprises worldwide.

TESTIFYING EXPERIENCE

Cases where James Geier has testified at depositions and trials:

Ericsson v. Apple

Law firm: Fish & Richardson

Expert on behalf of the defendant (Apple) during 2022 regarding patent litigation within the International Trade Commission. Analyzed patents, products, prior art and other case documents associated with wireless roaming algorithms; analyzed product firmware; wrote expert reports regarding patent invalidity and non-infringement; testified at deposition; testified at the International Trade Commission in 2022 (Judge Elliot).

IOENGINE v. Ingenico, Inc.

Law firm: Sunstein Kann Murphy & Timbers

Expert on behalf of Ingenico during 2021-2022 regarding patent litigation within the U.S. District Court – Delaware. Analyzed patents, products, prior art and other case documents associated with wireless credit card processing systems; analyzed product firmware; wrote expert reports regarding patent non-infringement and invalidity; testified at deposition; testified at a jury trial within the District Court of Delaware in 2022 (Judge Bryson).

AIG Specialty Insurance Company v. Pegatron Corporation

Law Firm: Gordon Rees

Expert on behalf of the plaintiff (AIG Specialty Insurance Company) during 2020-2021 regarding Wi-Fi / cellular interference issues within the Northern District of Georgia. Analyzed test reports and case documents; wrote a declaration; testified at deposition.

NTT Corporation, et al. v. MediaTek, Acer, and Texas Instruments

Law Firm: Dickinson Wright

Expert on behalf of the plaintiff (NTT Corporation) during 2020-2021 regarding claim construction within district court of the Western District of Texas. Analyzed patents and case documents related to wireless communications; wrote a declaration regarding claim construction; testified at deposition.

Bertram Communications, LLC v. Simon Westlake, et al.

Law Firm: Kilpatrick Townsend

Expert on behalf of the plaintiff (Bertram Communications) during 2019-2020 regarding trade secret litigation within the State of Wisconsin, Circuit Court, Sheboygan County. Analyzed wireless designs and other case documents associated with wireless ISP systems in relation to trade secret analysis; wrote expert reports regarding associated analysis; testified at deposition.

Ingenico, Inc.

Law firm: Sunstein Kann Murphy & Timbers

Expert on behalf of Ingenico regarding an Inter Partes Review (IPR) with the USPTO Patent Trial and Appeal Board during 2018-2020. Analyzed patents, prior art and other case documents associated with wireless credit card processing systems; wrote declarations regarding patent invalidity; testified at depositions.

Next Caller, Inc.

Law firm: McDermott Will & Emery

Expert on behalf of Next Caller regarding an Inter Partes Review (IPR) with the USPTO Patent Trial and Appeal Board during 2018-2019. Analyzed patents, prior art and other case documents associated with caller profile systems; wrote a declaration regarding patent validity; testified at deposition.

Samsung, Inc.

Law firm: Kirkland & Ellis

Expert on behalf of Samsung regarding an Inter Partes Review (IPR) with the USPTO Patent Trial and Appeal Board during 2018-2019. Analyzed patents, prior art and other case documents associated with battery charging systems for mobile devices; wrote declarations regarding patent invalidity; testified at deposition.

Foxconn Technology Group

Law firm: McDermott Will & Emery

Expert on behalf of Foxconn regarding an Inter Partes Review (IPR) within the USPTO Patent Trial and Appeal Board during 2018. Analyzed patents, prior art and other case documents associated with short circuit protection for reversible connectors; wrote a declaration regarding patent invalidity; testified at deposition.

ZTE, Inc.

Law firm: McDermott Will & Emery

Expert on behalf of ZTE, Inc. regarding an Inter Partes Review (IPR) within the USPTO Patent Trial and Appeal Board during 2018. Analyzed patents, prior art and other case documents associated with supplying a power source to mobile devices over standardized ports; wrote a declaration regarding patent invalidity; testified at deposition.

Certain Wireless Headsets

Law firm: Haynes Boone

Expert on behalf of defendants (BlueAnt, Creative, GN Netcom, Jawbone and Sony) during 2015-2018 regarding patent litigation within the International Trade Commission (ITC). Analyzed patents and other case documents associated with wireless audio headsets; wrote expert reports regarding patent written description and inception date; testified at deposition.

Camsoft Data Systems, Inc. v. Southern Electronics Supply and Active Solutions, LLC

Law firm: Melancon & Rimes

Expert on behalf of the plaintiff (Camsoft Data Systems) during 2014-2018 regarding trade secret litigation within the 19th Judicial District Court – State of Louisiana. Analyzed wireless designs and other case documents associated with wireless video surveillance systems in relation to trade secret analysis; wrote expert reports regarding associated analysis; testified at deposition.

United States of America v. IBM Corporation

Law firm: Jones Day

Expert on behalf of the defendant (IBM Corporation) during 2017 regarding litigation within the U.S. District Court, Northern District of Illinois - Eastern Division. Analyzed designs, contracts, and other case documents associated with wireless networks and integration methods; wrote an expert report regarding associated analysis; testified at deposition.

Emerson Electric Co.

Law firm: Ropes & Gray

Expert on behalf of Emerson Electric Co. regarding an Inter Partes Reviews (IPRs) within the USPTO Patent Trial and Appeal Board during 2016-2017. Analyzed patents, prior art and other case documents associated with optimum route determination over computer networks; wrote declarations regarding patent invalidity; testified at multiple depositions.

Emerson Electric Co.

Law firm: Ropes & Gray

Expert on behalf of Emerson Electric Co. regarding a Covered Business Method Patent Review (CBMPR) within the USPTO Patent Trial and Appeal Board during 2016-2017. Analyzed patents, prior art and other case documents associated with systems for communicating information; wrote declarations regarding patent invalidity; testified at multiple depositions.

Chrimar v. Aerohive

Law firm: Wilson, Sonsini, Goodrich & Rosati

Expert on behalf of the defendant (Aerohive) during 2016-2017 regarding patent litigation within the U.S. District Court – Eastern Division of Texas (Judge Gilstrap). Analyzed patents, products, and other case documents associated with power-over-Ethernet technologies; performed testing of power-over-Ethernet products; wrote an expert report regarding patent non-infringement; testified at deposition; testified at a jury trial within the District Court of Eastern Texas in 2017 (Judge Gilstrap).

Intellectual Ventures v. AT&T

Law firm: Dechert

Expert on behalf of the plaintiff (Intellectual Ventures) during 2014-2017 regarding patent litigation within the U.S. District Court - Delaware. Analyzed patents, prior art and other case documents associated with IEEE 802.11 encryption and quality of service (QoS) technologies; performed testing and protocol analysis of Wi-Fi products; wrote expert reports regarding patent infringement and validity; testified at deposition.

Chrimar v. AMX

Law firm: McDermott, Will & Emery

Expert on behalf of the defendant (AMX) during 2016 regarding patent litigation within the U.S. District Court – Eastern Division of Texas. Analyzed patents, products, prior art and other case documents associated with power-over-Ethernet technologies; performed testing of power-over-Ethernet products; wrote expert reports regarding patent non-infringement and invalidity; testified at deposition.

Universal Remote

Law firm: Ostrolenk Faber

Expert on behalf of Universal Remote regarding an Inter Partes Review (IPR) within the USPTO Patent Trial and Appeal Board filed during 2015. Analyzed patents, prior art and other case documents associated with TV remote control technologies; wrote a declaration regarding patent invalidity; testified at deposition.

Skyhook v. Google

Law firm: Tensegrity

Expert on behalf of the plaintiff (Skyhook) during 2012-2015 regarding patent litigation within the U.S. District Court - Boston. Analyzed patents, software, and other case documents associated with Wi-Fi-based location systems; performed in-depth review and analysis of associated software; wrote an expert report regarding patent infringement; testified at deposition.

MTEL v. UPS

Law firm: Reed & Scardino

Expert on behalf of the plaintiff (MTEL) during 2014 regarding patent litigation within the U.S. District Court – Atlanta. Analyzed patents, prior art and other case documents associated with mail delivery notifications; wrote an expert report regarding patent validity; testified at deposition.

Motorola v. Microsoft

Law firm: Sidley Austin

Expert on behalf of the defendant (Microsoft) during 2012 regarding patent litigation within the International Trade Commission. Analyzed patents, products, prior art and other case documents associated with data addressing and data update mechanisms; wrote expert reports on patent invalidity and indirect non-infringement; testified at deposition; testified at the International Trade Commission in 2012 (Judge Shaw).

Motorola v. Microsoft

Law firm: Sidley Austin

Expert on behalf of the defendant (Microsoft) during 2011 regarding patent litigation within the International Trade Commission. Analyzed patents, products, prior art and other case documents associated with security and encryption protocols; analyzed product firmware; wrote expert reports regarding patent invalidity and non-infringement; testified at deposition; testified at the International Trade Commission in 2011 (Judge Shaw).

Motorola v. Microsoft

Law firm: Sidley Austin

Expert on behalf of the defendant (Microsoft) during 2011 regarding patent litigation within the U.S. District Court – Southern Florida. Analyzed patents, products, prior art and other case documents associated with application registry and data update technologies; wrote expert reports regarding patent invalidity and non-infringement; testified at deposition.

Autocell v. Cisco Systems

Law Firm: Hanify & King

Expert on behalf of the plaintiff (Autocell) during 2009-2011 regarding patent litigation within the U.S. District Court - Delaware. Analyzed patents, products, prior art and other case documents associated with transmit power control of 802.11 radios and access points; performed laboratory and field testing of associated products; analyzed product firmware; wrote expert reports regarding patent infringement and validity; testified at deposition.

Truckstop.Net v. Sprint Communications

Law Firm: Holland & Hart

Expert on behalf of the plaintiff (Truckstop.Net) during 2004-2010 regarding contract litigation within the U.S. District Court - Idaho. Analyzed case documents including wireless network designs and contracts associated with wireless networks installed at truck stops; performed in-depth field testing and analysis of wireless signal coverage and performance at truck stops located throughout the U.S.; wrote expert reports regarding test results and review of case documents; testified at deposition.